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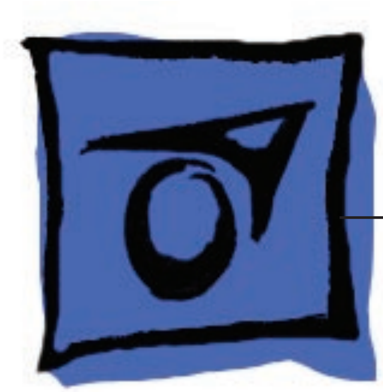

Power Mac G5

Power Mac G5, Power Mac G5 (June 2004), Power Mac G5 (Early 2005)

Updated: 9 August 2005

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Power Mac G5

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Service Source

Basics

Power Mac G5

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Overview

Power Mac G5 is a 64-bit desktop computer powered by the PowerPC G5 processor in uni- or dual-processor configurations. It offers memory expansion up to 8 GB, front-side bus up to 1.25 GHz, and advanced 64-bit computation, while running existing 32-bit applications natively. The computer also includes serial ATA hard drives, high-end graphics capabilities, and computer-controlled cooling based on four independent zones.

This manual covers the following Power Mac G5 models: original Power Mac G5, Power Mac G5 (June 2004), and Power Mac G5 (Early 2005). The tables on the next page illustrate the main differences between these computers. For complete technical specifications, refer to **http://www.info.apple.com/support/applespec.html**

Original Power Mac G5

Original Uni 1.6 GHz	Original Uni 1.8 GHz	Original Dual 1.8GHz	Original Dual 2.0GHz
800 MHz front bus	900 MHz front bus	900 MHz front bus	1 GHz front bus
256 MB DDR333 SDRAM, expandable to 4 GB	512 MB DDR400 SDRAM, expandable to 8 GB	512 MB DDR400 SDRAM, expandable to 8 GB	512 MB DDR400 SDRAM, expandable to 8 GB
80 GB Serial ATA drive	160 GB Serial ATA drive	160 GB Serial ATA drive	160 GB Serial ATA drive
SuperDrive	SuperDrive	SuperDrive	SuperDrive
Three PCI slots	Three PCI-X slots	Three PCI-X slots	Three PCI-X slots
NVIDIA GeForce FX 5200 Ultra video	NVIDIA GeForce FX 5200 Ultra video	NVIDIA GeForce FX 5200 Ultra video	ATI Radeon 9600 Pro video
450 W power supply	450 W power supply	600 W power supply	600 W power supply
56K modem	56K modem	56K modem	56K modem

Power Mac G5 (June 2004)

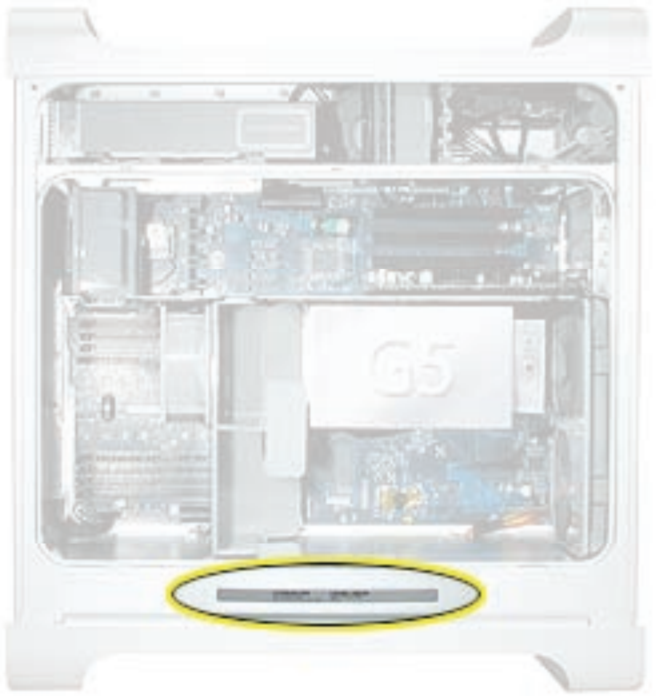
June 2004 Dual 1.8 GHz	June 2004 Dual 2.0 GHz	June 2004 Dual 2.5 GHz (with LCS Heasink)
900 MHz front bus	1 GHz front bus	1.25 GHz front bus
256 MB DDR400 SDRAM, expandable to 4 GB	512 MB DDR400 SDRAM, expandable to 8 GB	512 MB DDR400 SDRAM, expandable to 8 GB
80 GB Serial ATA drive	160 GB Serial ATA drive	160 GB Serial ATA drive
SuperDrive	SuperDrive	SuperDrive
Three PCI slots	Three PCI-X slots	Three PCI-X slots
NVIDIA GeForce FX 5200 Ultra video	NVIDIA GeForce FX 5200 Ultra video	ATI Radeon 9600 XT video
450 W power supply	600 W power supply	600 W power supply
56K modem	56K soft modem	56K soft modem

Power Mac G5 (Early 2005)

Early 2005 Dual 2.0 GHz	Early 2005 Dual 2.3 GHz	Early 2005 Dual 2.7 GHz (with LCS Heasink)
900 MHz front bus	1 GHz front bus	1.25 GHz front bus
512 MB DDR400 SDRAM, expandable to 8 GB	512 MB DDR400 SDRAM, expandable to 8 GB	512 MB DDR400 SDRAM, expandable to 8 GB
160 GB Serial ATA drive	250 GB Serial ATA drive	250 GB Serial ATA drive
SuperDrive	SuperDrive	SuperDrive
Three PCI slots	Three PCI-X slots	Three PCI-X slots
ATI Radeon 9600 video	ATI Radeon 9600 video	ATI Radeon 9650 video
450 W power supply	450 W power supply	600 W power supply

Serial Number Location

To identify a particular model of Power Mac G5, check the computer's serial number, which lists the model's configuration. The serial number is located directly below the air deflector inside the side access panel.



Features

Overview

PowerPC G5 — The Power Mac G5 computer incudes the new 64-bit PowerPC G5 processor running at 1.6, 1.8, 2.0, 2.3, 2.5, or 2.7 GHz, well beyond the speeds of G4 processors.

Serial ATA hard drives — Unlike older parallel drives, the new serial ATA drives in the Power Mac G5 offer up to 150 MB/s data throughput. The 7200 rpm drives come in 80, 160, 250, or 400 GB capacity.

PCI-X slots — Higher-bandwidth PCI slots allow for greater amounts of data when using expansion cards that demand high performance. Both 100 and 133 MHz PCI-X slots are included in higher-end Power Mac G5 computers. For more information, see the "**AGP/PCI Card**" topic in the Take Apart chapter.

8x AGP bus — This bus provides a higher amount of data transfer to and from the graphics card. Both NVIDIA and ATI graphics cards are offered for the Power Mac G5.

USB 2.0 — All USB ports on the Power Mac G5 support the USB 2.0 standard, which accommodates more high speed peripherals.

Digital audio in and out — The Power Mac G5 introduces two new optical audio (S/PDIF) ports, allowing for optical audio input and output. These ports are in addition to the existing analog sound input and output ports.

Cooling zones — Nine case fans and blowers are logically grouped into four separate cooling zones in the Power Mac G5. Each zone is software-controlled by the system to only cool when necessary, making for a more efficient (and quieter) cooling solution.

ATA/100 bus for optical drives— This technology allows optical storage to read/write data faster.

Double-layer SuperDrives — Power Mac G5 (Early 2005) 16x SuperDrives support double-layer (DVD+R DL) discs. Double-layer discs have two layers of data, allowing the SuperDrive to read and write on either layer, almost doubling the storage to 8.5GB.

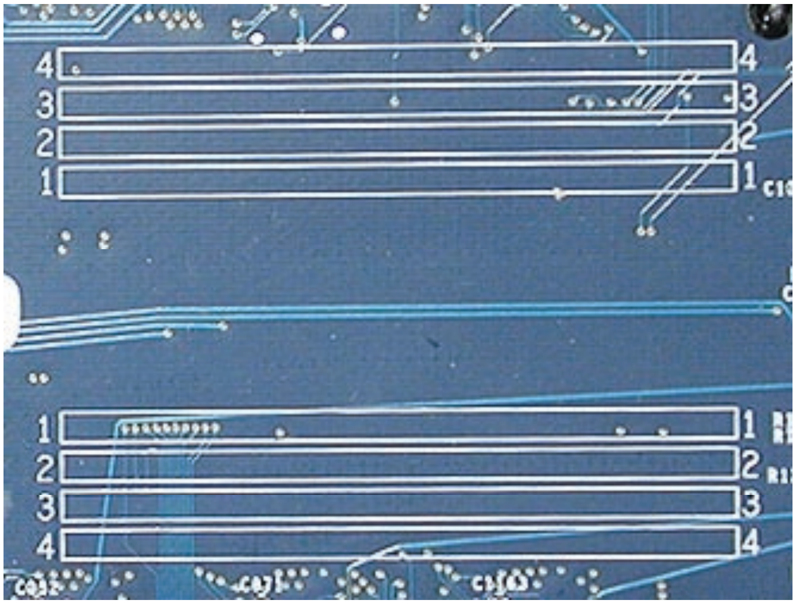
Interleaved DDR RAM —The Power Mac G5 requires pairs of DIMMs, which improves performance. Different models require either DDR 333 or DDR 400 RAM. DIMMs must be installed in pairs of equal size and kind. For more information, see the "**Memory (DIMMs)**" topic in the Take Apart chapter.

Liquid Cooling System — The Power Mac G5 (June 2004 Dual 2.5 GHz and Early 2005 Dual 2.7

GHz) models feature a liquid cooling system that is more efficient than a traditional heat sink. This system provides a continuous flow of thermally conductive fluid that transfers heat from the processors. The heated fluid then flows through a radiant grille, where air passing over cooling fins returns the fluid to its original temperature.

DDR Memory

Depending on the model, Power Mac G5 computers have either four or eight Dual Inline Memory Module (DIMM) slots for Double-Data-Rate (DDR) Synchronous Dynamic Random-Access Memory (SDRAM) devices. The computers ship with a minimum of 256 MB of RAM, installed as a pair of 128 MB DIMMs in two of the DIMM slots. You can install additional DIMMs, provided they are installed in pairs of equal size. A diagram marked on the logic board near the slots illustrates how the pairs must be installed.



To determine the types of DIMMs to install, refer to the table below:

DIMM Slots	DIMM Speed	Maximum Amount
4 (two banks of 2 slots)	333 MHz, PC 2700	up to 4 GB
8 (two banks of 4 slots)	400 MHz, PC 3200	up to 8 GB

In addition, DIMMs must fit these specifications:

- 2.5 volt
- 184-pin module
- Maximum number of memory devices on DDR SDRAM:16
- Nonparity
- Non-error-correcting (NECC)*

***Note:** Although they do not take advantage of error-correcting (ECC) RAM features, Power Mac G5 computers can also use ECC memory.

Video

The Power Mac G5 computer comes with a graphics card installed in the AGP slot. All graphics cards support dual displays in either extended desktop or video mirroring mode.

The display memory on the AGP card is separate from the main memory. The display memory consists of 64, 128, or 256 MB of DDR video SDRAM. The display memory cannot be expanded by the user.

The following table lists the standard and CTO graphics cards used in Power Mac G5 computers. (Port 1 indicates the connector that is next to the logic board when the card is installed.)

Original G5 Graphics Cards	**Video SDRAM**	**Port 2**	**Port 1**
NVIDIA GeForce FX 5200 Ultra	64 MB DDR	DVI	ADC
ATI Radeon 9600 Pro	64 MB DDR	DVI	ADC
ATI Radeon 9800 Pro	128 MB DDR	DVI	ADC
NVIDIA GeForce 6800 Ultra DDL*	256 MB DDR	dual-link DVI TV out	dual-link DVI TV out

June 2004 G5 Graphics Cards	**Video SDRAM**	**Port 2**	**Port 1**
NVIDIA GeForce FX 5200 Ultra	64 MB DDR	DVI	ADC
ATI Radeon 9600 XT	128 MB DDR	DVI	ADC
ATI Radeon 9800 XT*	256 MB DDR	DVI	ADC
NVIDIA GeForce 6800 GT DDL*	256 MB DDR	dual-link DVI TV out	dual-link DVI TV out
NVIDIA GeForce 6800 Ultra DDL*	256 MB DDR	dual-link DVI TV out	dual-link DVI TV out

Early 2005 G5 Graphics Cards	**Video SDRAM**	**Port 2**	**Port 1**
ATI Radeon 9600	128 MB DDR	single-link DVI	single-link DVI TV out
ATI Radeon 9650	256 MB DDR	dual-link DVI	single-link DVI TV out
NVIDIA GeForce 6800 Ultra DDL*	256 MB DDR	dual-link DVI TV out	dual-link DVI TV out
ATI Radeon X850 XT	256 MB DDR	dual-link DVI TV out	ADC

* Due to its large size, this card occupies both the AGP slot and the adjacent PCI slot. For this reason, the number of available PCI slots is reduced from three to two.

Fan Controller

The Power Mac G5 system employs advanced thermal management to keep acoustic noise to a minimum. The system is divided into discrete zones, each with independently controlled fans bringing in cool air from the front of the enclosure, directing it through ducts and exhausting it out the rear. Temperature and power consumption are monitored by the operating system, which communicates with the Fan Control Unit, which in turn controls and monitors fan operation. Note that if Mac OS X is not booted, thermal management will not work correctly.

Important: To ensure proper fan and temperature control, you must run Apple Service Diagnostic whenever you replace a processor or logic board with a new processor or logic board. You must also run the diagnostic if you re-install the same processor but in a different connector from the one in which it was originally installed. For more information, see "**Thermal Calibration**" in the Troubleshooting chapter.

Optical Audio

Digital data is transmitted to and from the optical audio I/O using special optical cables. The 7.5 mm digital optical connectors on the cables, commonly referred to as TOSLink, are for both input and output and conform to the IEC60874-17 connector standard.

The TOSLink friction-lock type F-05 connectors are available from pro-audio, musician's supply, hi-fi, and other retailers.

Analog audio signals are converted to digital data internally. All audio is handled digitally inside the computer, including audio data from the CD or DVD drive and from devices connected to the USB and FireWire ports. Audio data is converted to analog form for output to the internal speaker, the headphones, or the analog output port.

Wireless

The Power Mac G5 supports wireless networking with an AirPort Extreme Card and AirPort Extreme Base Station or AirPort Express. AirPort Extreme uses the 802.11g wireless standard to deliver data rates up to 54 Mbps.

The Power Mac G5 also supports an optional internal Apple Bluetooth module. Bluetooth technology enables short-range wireless connections between desktop and laptop computers and other peripheral devices such as cell phones, PDAs, and printers. Support for Bluetooth is built into Mac OS X and compliant with Bluetooth specification v1.1. It operates on a globally available 2.4 GHz frequency band (ISM band) for worldwide compatibility and has a maximum throughput of 1 Mbps.

Important: For proper range and operation, the external Bluetooth antenna and external AirPort antenna must be attached to the Bluetooth and AirPort ports on the back of the Power Mac G5.

Ports

The following ports are included on the front and back panels of the Power Mac G5. For illustrations of the port locations, see the "**External Views**" topic in the Views chapter.

Front

- Power button
- Headphone port
- USB 2.0 port
- FireWire 400 port

Rear

- AirPort antenna port
- Bluetooth antenna port
- Optical audio-out port
- Optical audio-in port
- Audio line-out port
- Audio line-in port
- USB 2.0 ports (two ports)
- FireWire 400 port
- FireWire 800 port
- 10/100/1000Base-T Ethernet port
- Modem port

Service Source

Take Apart

Power Mac G5

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General Information

Orientation

For most take-apart procedures, it is recommended that you lay the computer on its side before removing or installing the part. For proper operation, however, Apple recommends that the unit be run in the upright position. The computer should never be operated on its side with the access panel facing down.

Tools

The following tools are required to service the computer:

- Long-handled magnetic Phillips screwdriver (10-inch shaft)
- Short-handled magnetic Phillips screwdriver
- Flatblade screwdriver
- Jeweler's flatblade screwdriver
- Nylon probe tool (black stick 922-5065)
- Needlenose pliers
- Small wire cutter
- Long-handled 2.5 mm hex wrench
- Mat knife and cup hook (to remove locking rivet)
- Tape (for temporarily holding cables out of the way)
- Small mirror (for seeing small boards inside the enclosure)
- Soft cloth (for protect removed parts from scratches)

Parts Requiring Enclosure Replacement

The following are not separate, orderable parts. To replace them, you must replace the enclosure.

- Media blower
- Media fan
- Hard drive locking latches
- Hard drive bay
- Optical drive levers
- Media shelf
- Power harness cable, including hard drive power cables
- Media bay sensor and air deflector sensor cable
- Rear panel latch

Take Apart Procedures

This manual covers several different Power Mac G5 models. Some models may look slightly different from the one shown in the illustrations; however, except where indicated, the following procedures apply to all models.

Opening the Computer

Tools

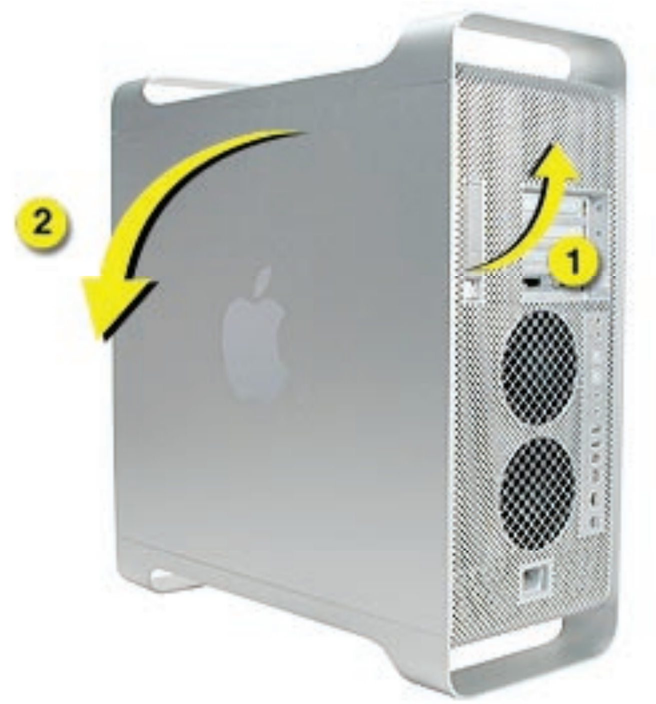
No tools are required for this procedure.

Preliminary Steps

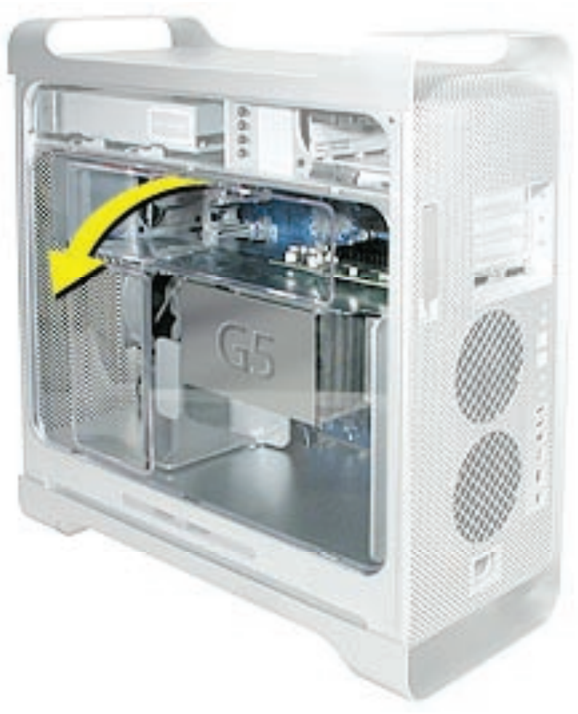
1. Shut down the computer.
   Warning: Always shut down the computer before opening it to avoid damaging its internal components or the components you are installing. Do not open the computer or attempt to install items inside it while it is on.
2. Wait 5 to 10 minutes to allow the computer's internal components to cool.
   Warning: After you shut down the system, the internal components can be very hot. You must let the computer cool down before continuing.
3. Unplug all external cables from the computer except the power cord.
4. Touch the metal PCI access covers on the back of the computer to discharge any static electricity from your body.
   Important: Always discharge static before you touch any parts or install any components inside the computer. To avoid generating static electricity, do not walk around the room until you have finished working and closed the computer.
5. Unplug the power cord.
   Warning: To avoid damaging its internal components or the components you want to install, always unplug the computer before attempting any take-apart procedure.
6. Put on an ESD wrist strap.

Procedure

1. Hold the side access panel and lift the latch on the back of the computer.
   Warning: The edges of the access panel and the enclosure can be sharp. Be very careful when handling them.
2. Remove the access panel and place it on a flat surface covered by a soft, clean cloth.
   Replacement Note: Make sure the latch is in the up position before replacing the access panel. If the latch is down, the access panel will not seat correctly in the enclosure.



3. Remove the air deflector and place it on a soft, clean cloth.



Replacement Note: To replace the air deflector, insert the three tabs on the bottom edge of the deflector into the three slots in the bottom frame of the enclosure. Then swing the deflector up flush against the top frame of the enclosure.

Important: Make sure you re-install the air deflector before replacing the access panel. If the air deflector is not installed, the computer will not function properly.

Serial ATA Hard Drive

The Power Mac G5 computer can accommodate two serial ATA hard drives in its internal hard drive bay. In most configurations, a single hard drive occupies the top portion of the bay. You can install one additional serial ATA hard drive to the empty slot in the bay.

Important: Use the original Apple cables that came with the Power Mac G5 when installing ATA hard drives.

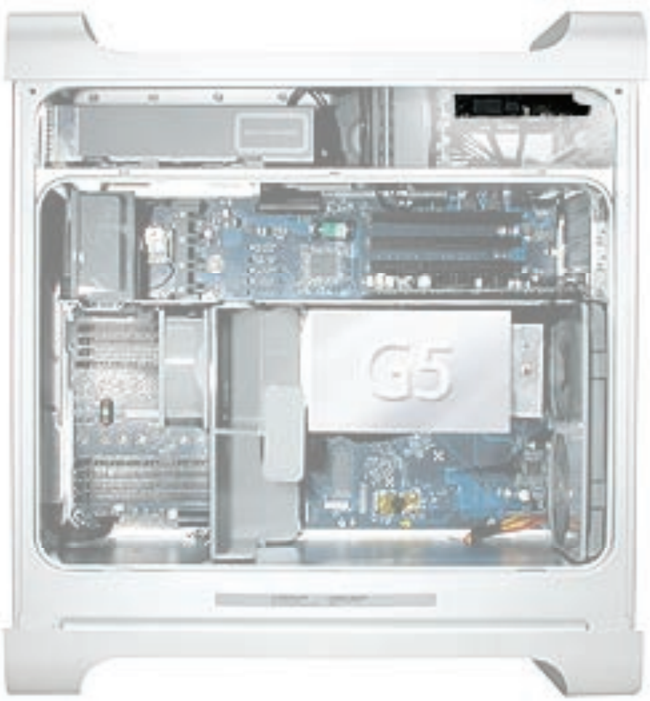
Tools

The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

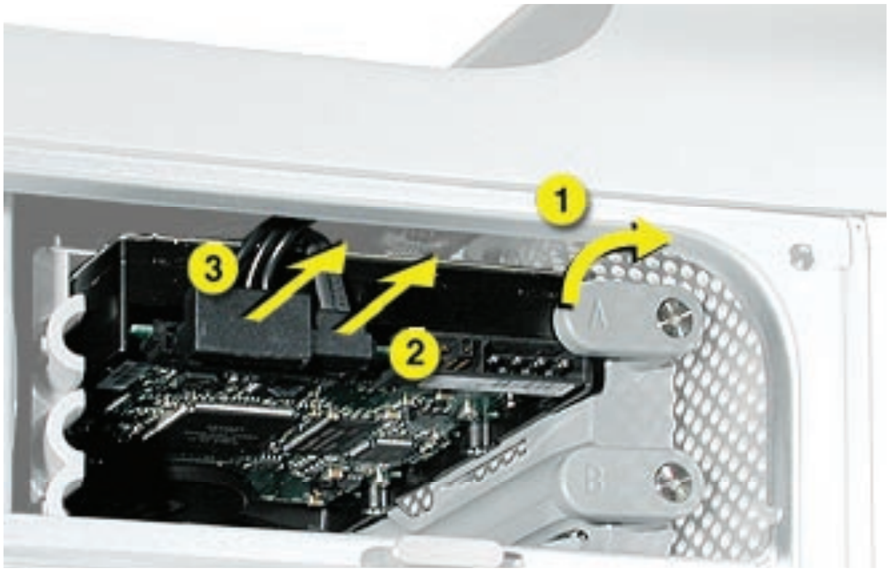
Before you begin, open the computer.

Part Location

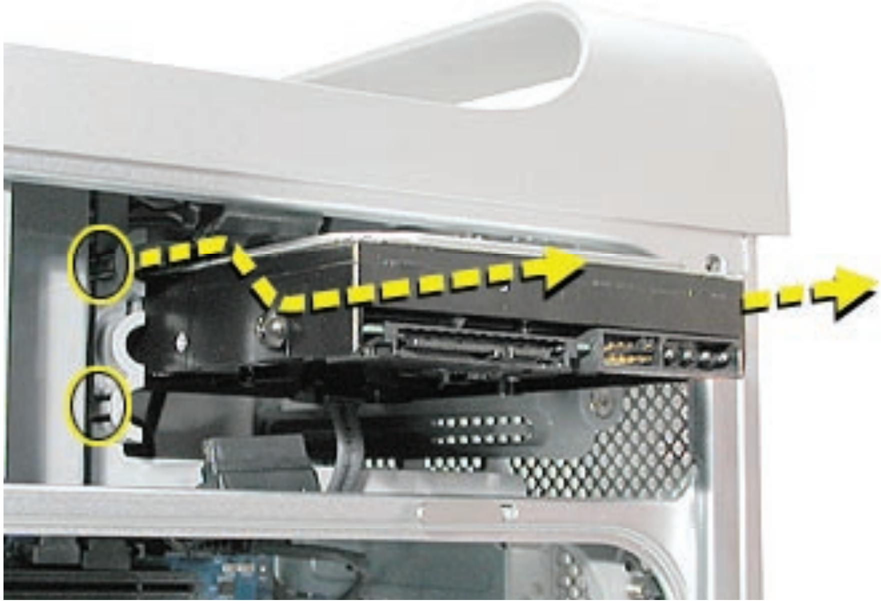


Procedure

1. Release the drive locking latch by rotating it up.
2. Disconnect the drive data cable and power cable from the hard drive.

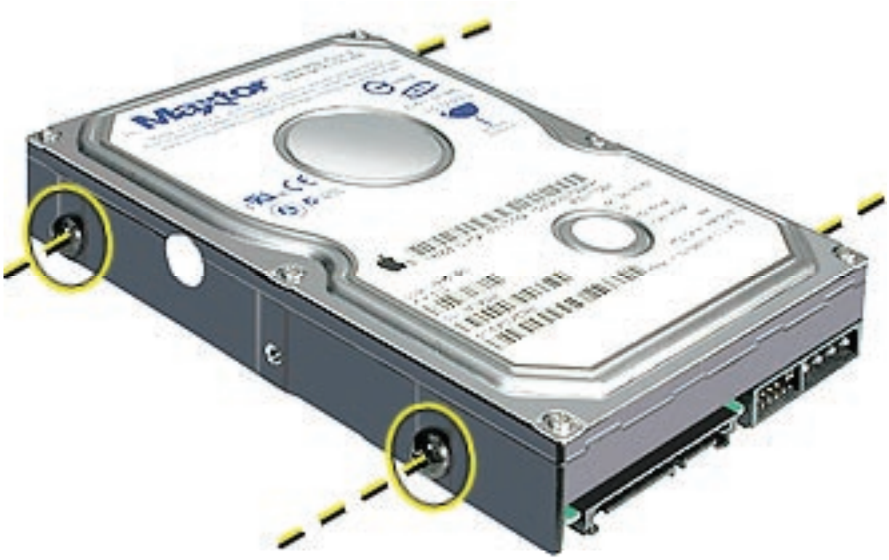


3. Pull the drive out of the drive bay, being careful not to touch the bottom of the drive.
   Note: If you encounter resistance, use a flatblade screwdriver to release the latches on the drive bay rails as you pull the drive out of the bay. (See circled areas on the illustration below.) If two drives are installed, remove the bottom drive first.

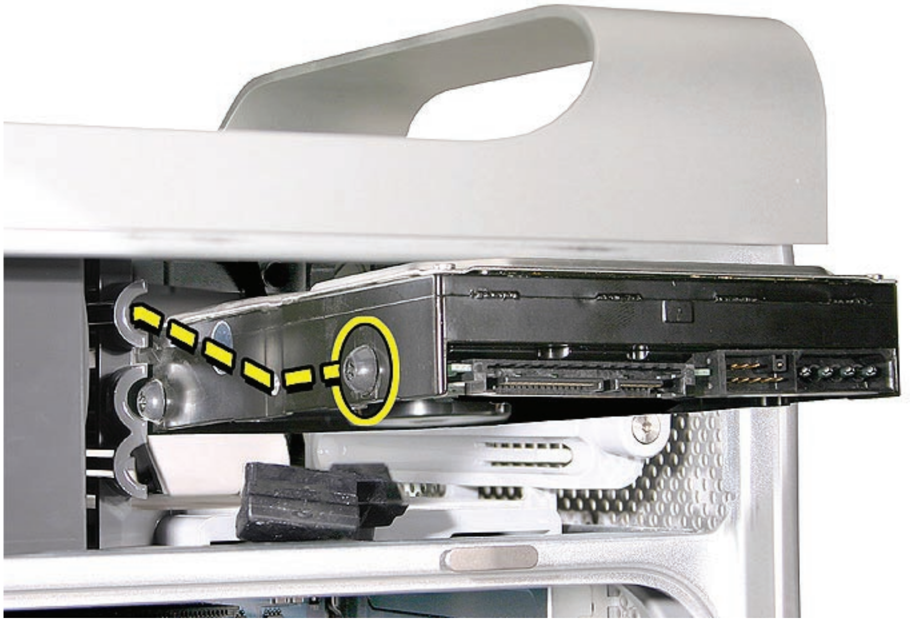


Important: If the printed circuit board (PCB) is exposed on the bottom of the hard drive, hold the drive by its sides. To avoid damaging the replacement drive, take care not to touch the PCB during installation.

Replacement Note: If you are replacing a hard drive with a new drive, transfer the four guide screws from the sides of the original drive to the new drive. If you are installing an additional drive, transfer the guide screws from the side of the hard drive bay to the drive



Replacement Note: When replacing the top drive, make sure the guide screws align with the middle slot of the drive bay, and then gently push the drive into the bay until it snaps into place.



When installing a bottom drive, align the guide screws with the bottom slot of the drive bay and slide the drive in until it snaps into place.

Serial ATA Hard Drive Data Cable

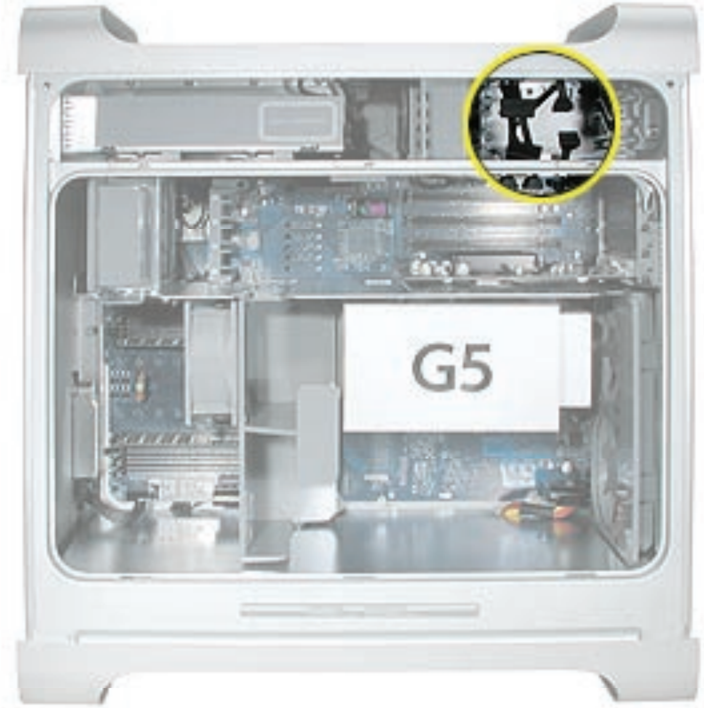
Tools

The only tool required for this procedure is a small wire cutter.

Preliminary Steps

Before you begin, open the computer and **remove the hard drive(s)**.

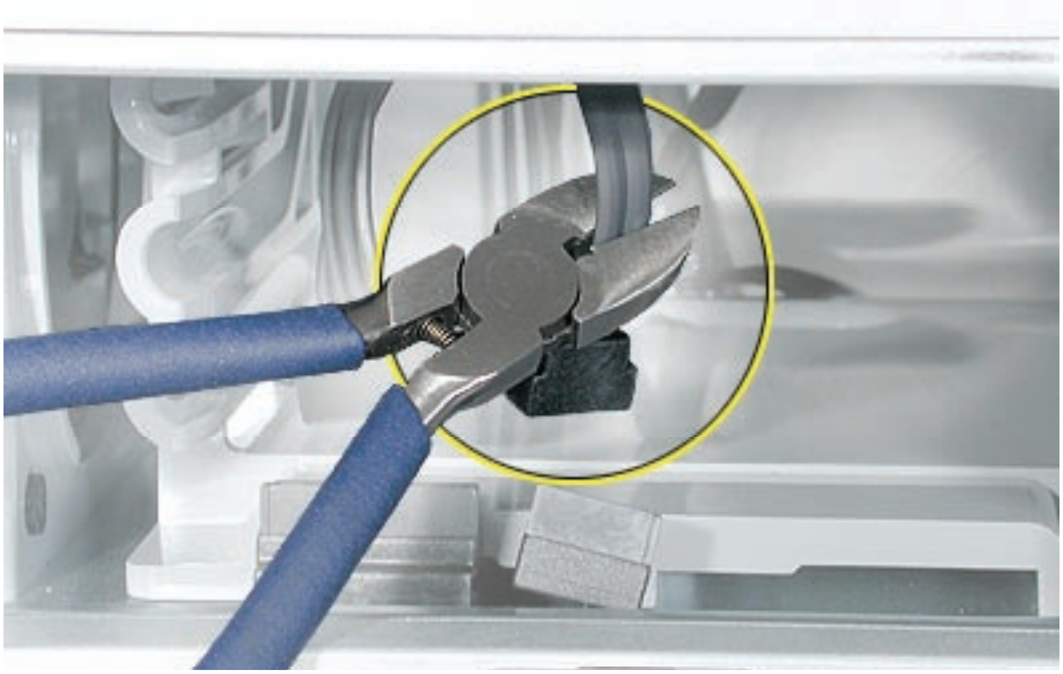
Part Location



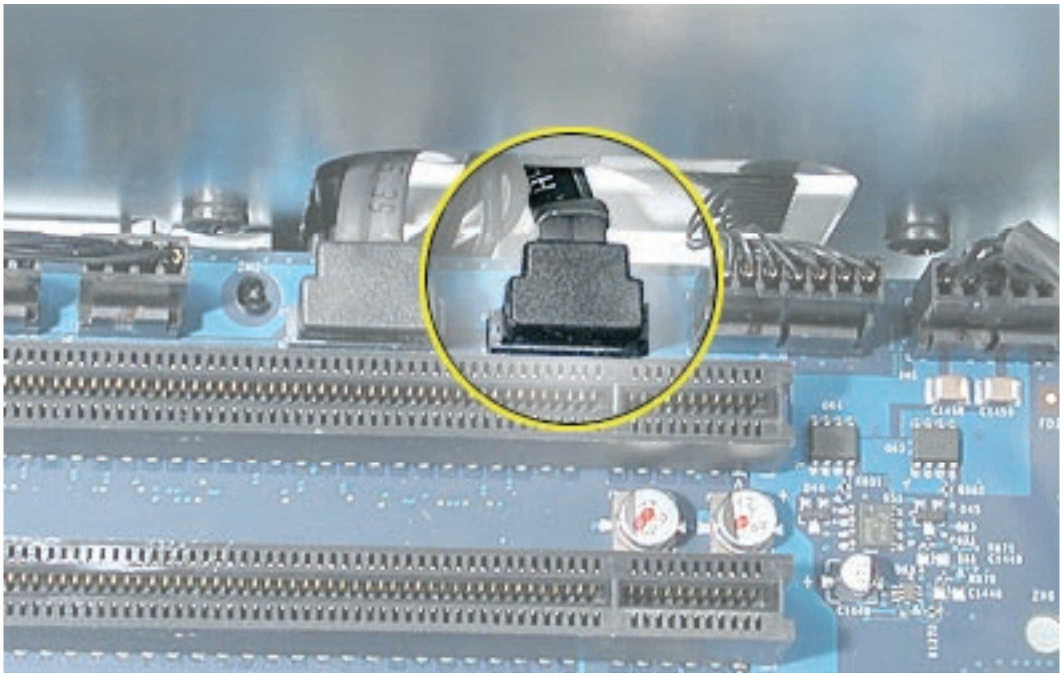
Procedure

Upper Hard Drive Cable

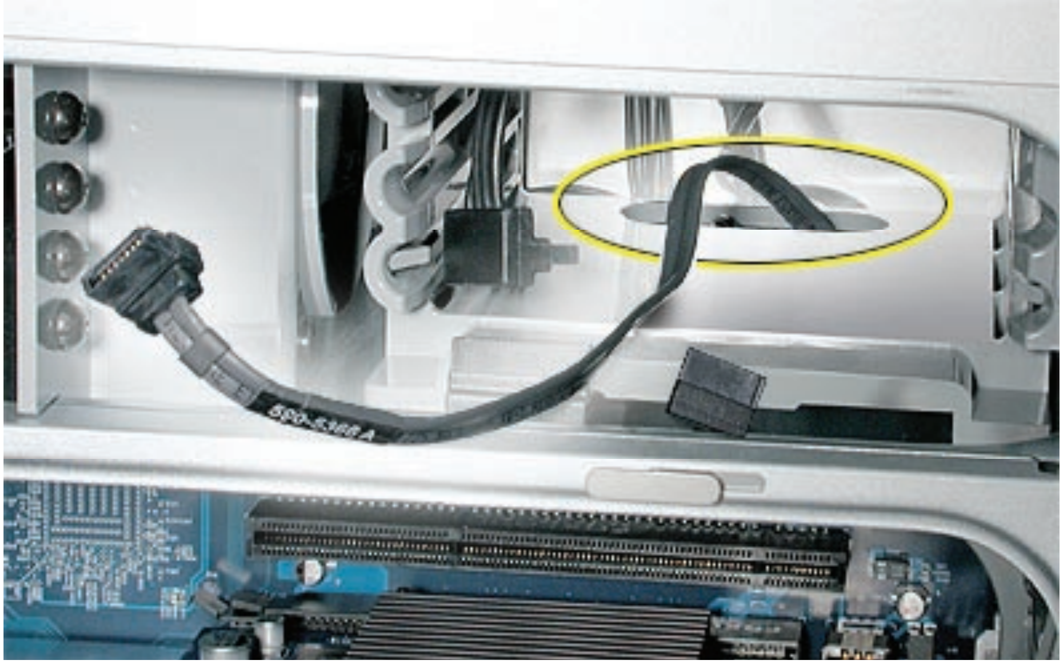
1. Clip off the connector from the hard drive end of the upper hard drive data cable.



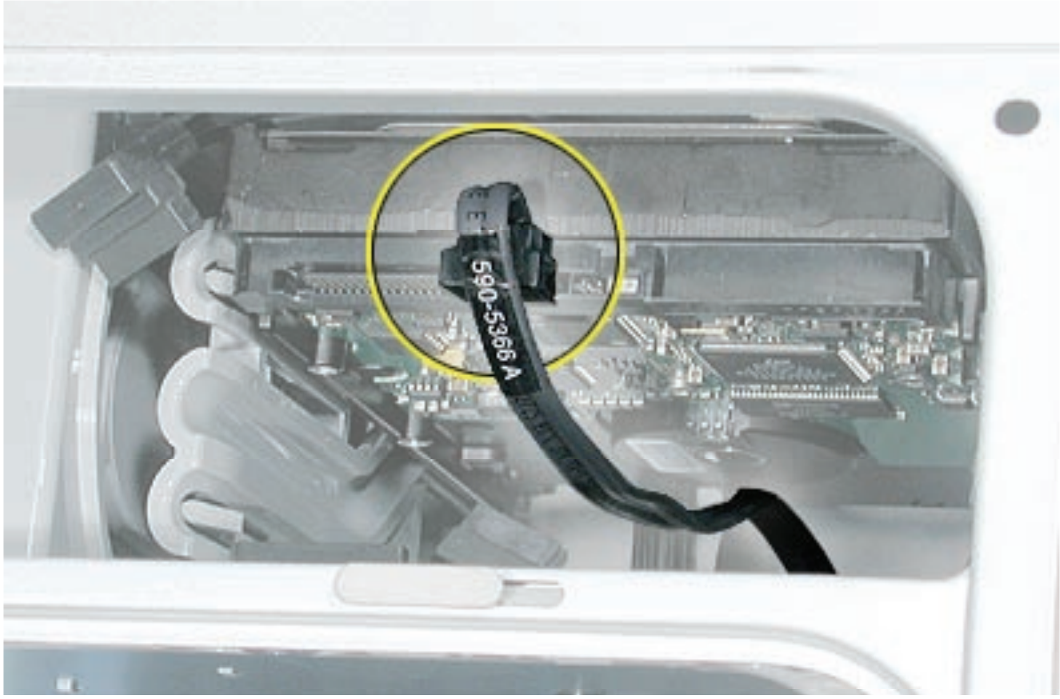
2. Disconnect the cable from the logic board, pull the cable out of the hard drive bay, and remove the cable from the enclosure.



Replacement Note: When installing the replacement upper hard drive cable, first route the cable through the opening in the hard drive bay.

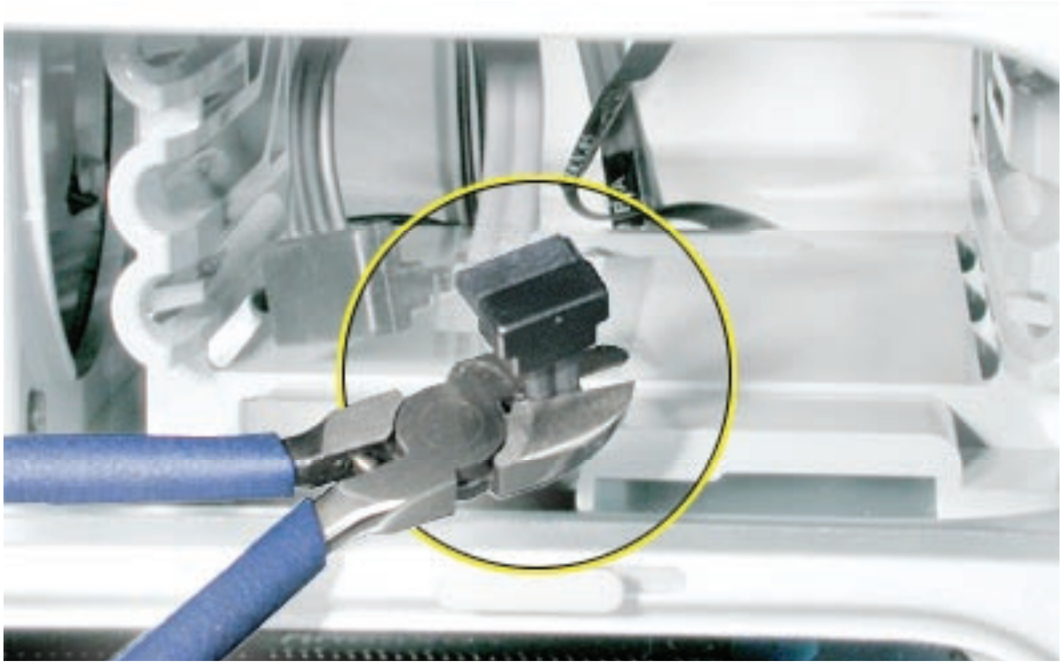


Then install the upper hard drive with the cable routed below the drive, and connect the cable to the drive as illustrated.

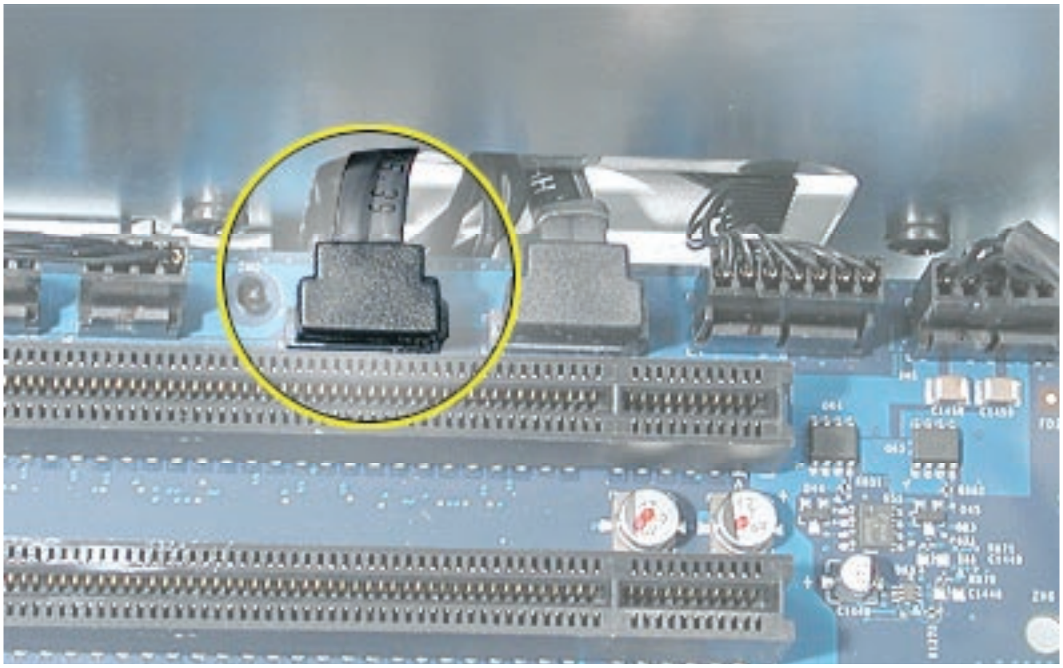


Lower Hard Drive Cable

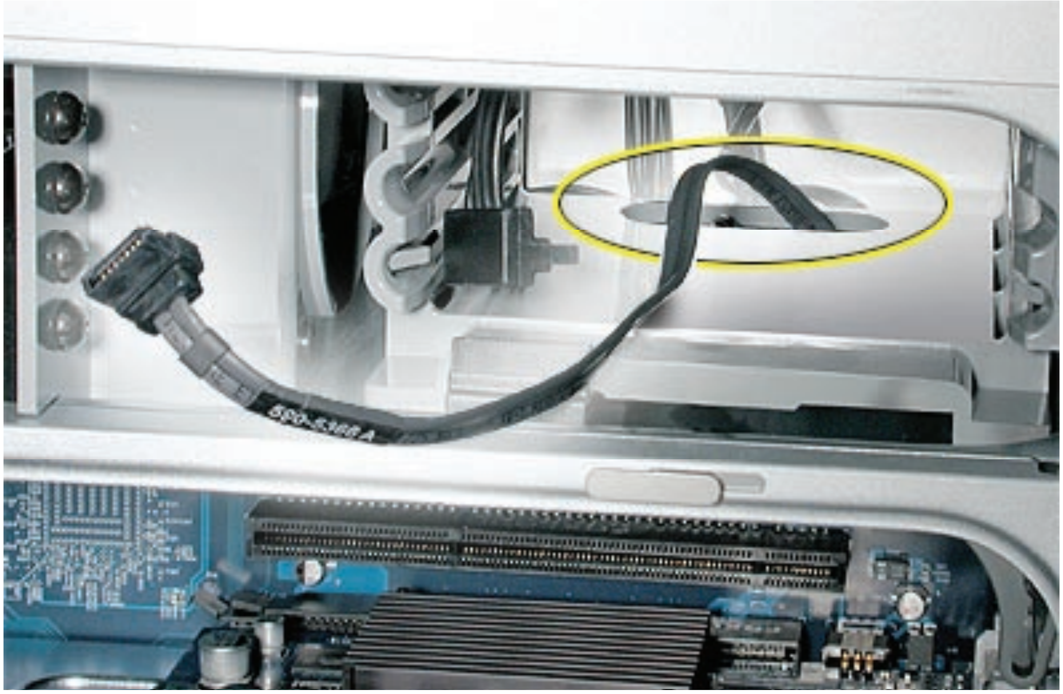
1. Clip off the connector from the hard drive end of the lower hard drive cable.



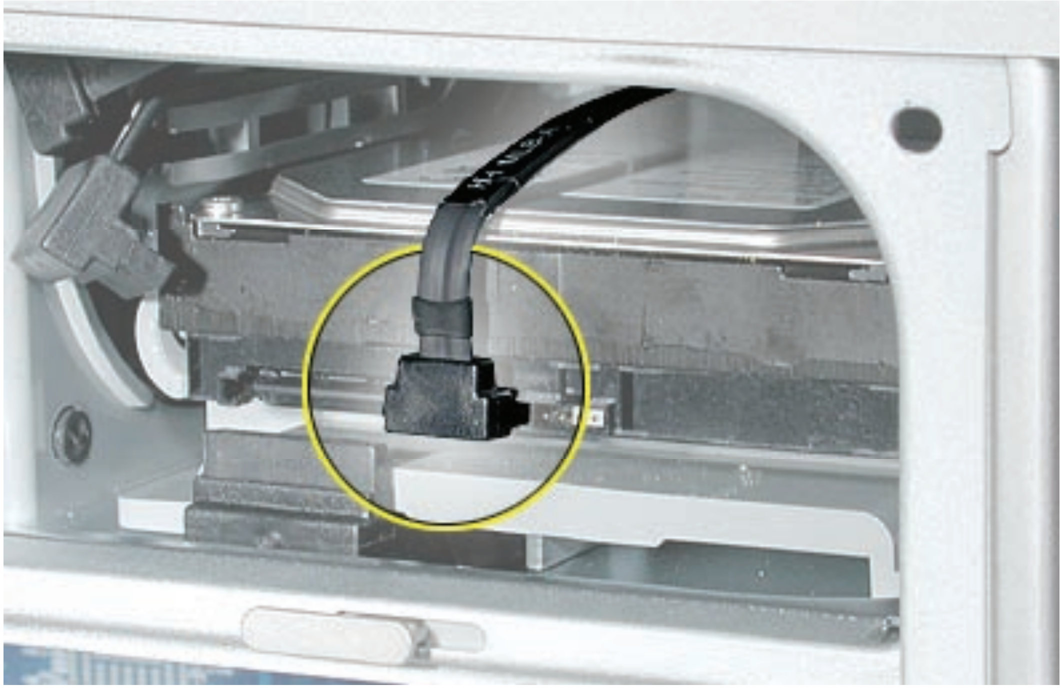
2. Disconnect the cable from the logic board, pull the cable out of the hard drive bay, and remove the cable from the enclosure.



Replacement Note: When installing the replacement lower hard drive cable, first route the cable through the opening in the hard drive bay.



Then install the lower hard drive with the cable routed above the drive, and connect the cable to the drive as illustrated.



Optical Drive

Important: When installing a replacement optical drive, use the original Apple cables that came with the Power Mac G5.

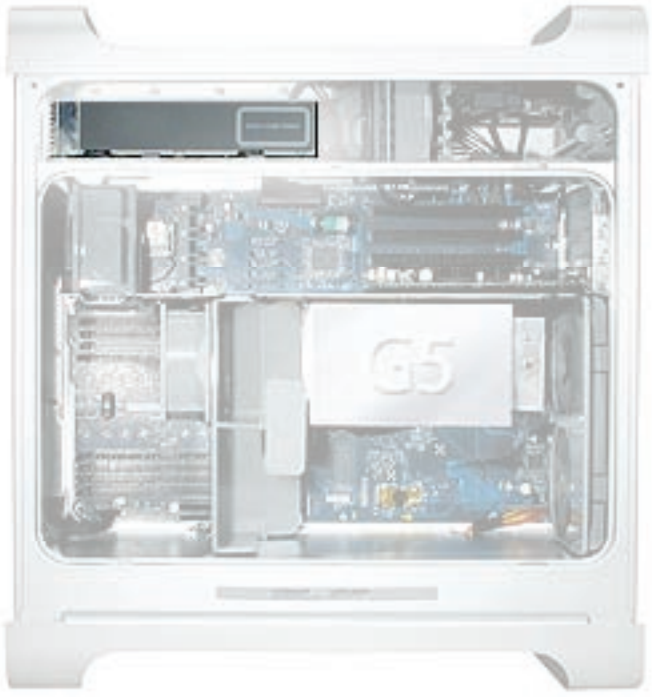
Tools

No tools are required for this procedure.

Preliminary Steps

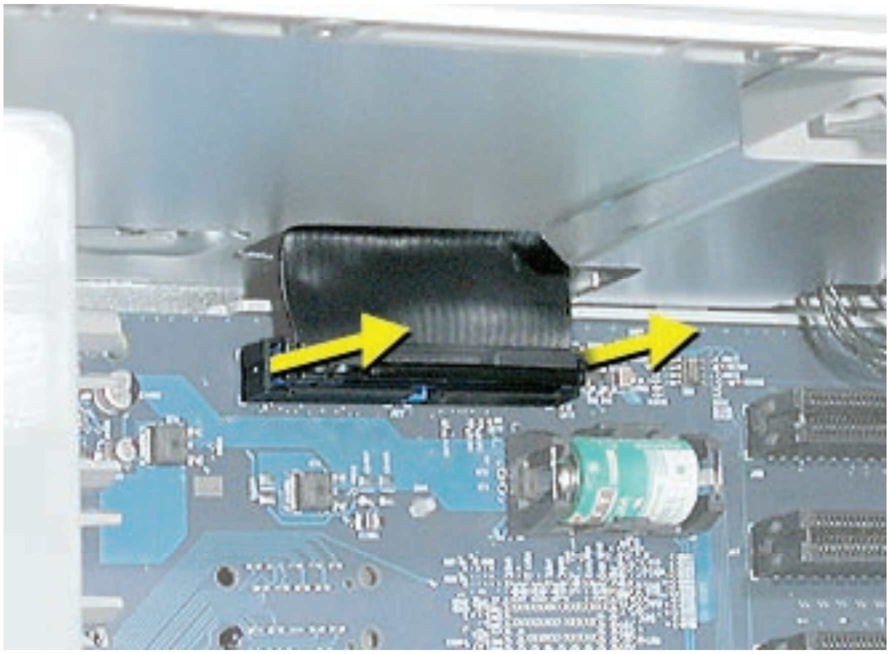
Before you begin, open the computer.

Part Location

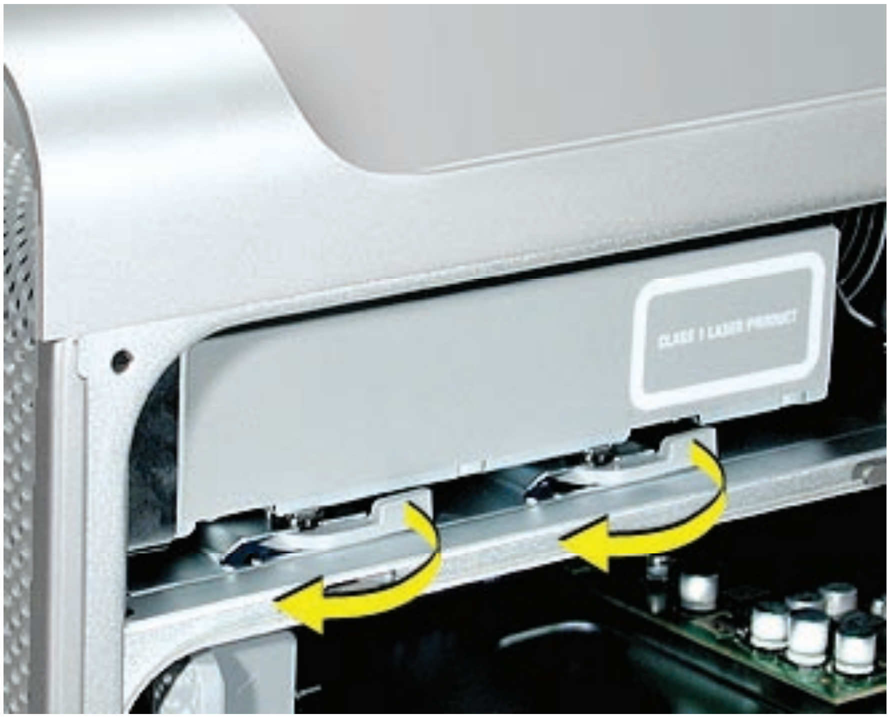


Procedure

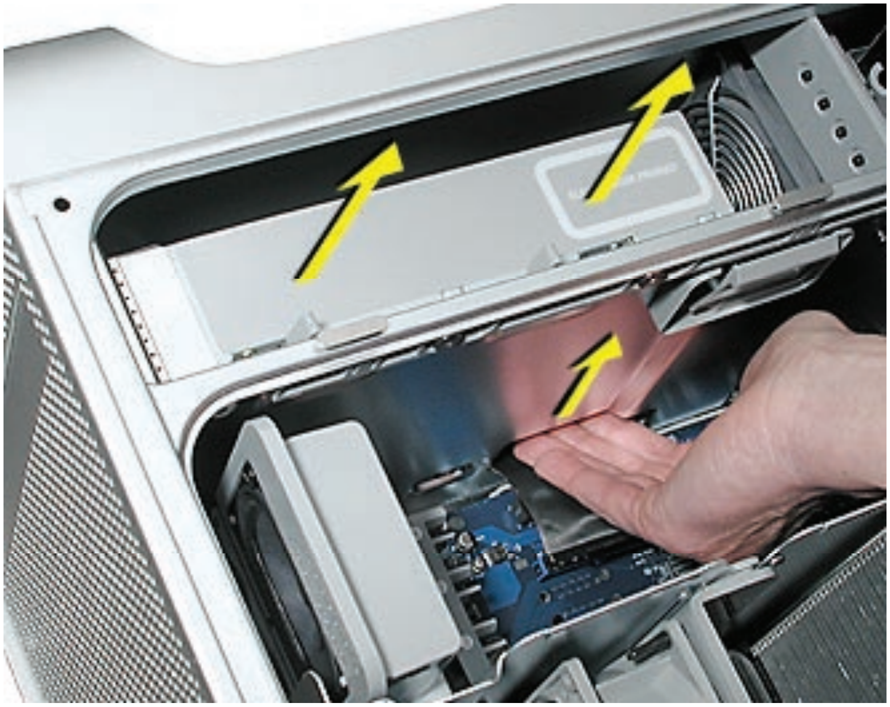
1. Disconnect the optical drive ribbon cable from the logic board. (The cable connector is located under the media shelf that holds the optical drive.)



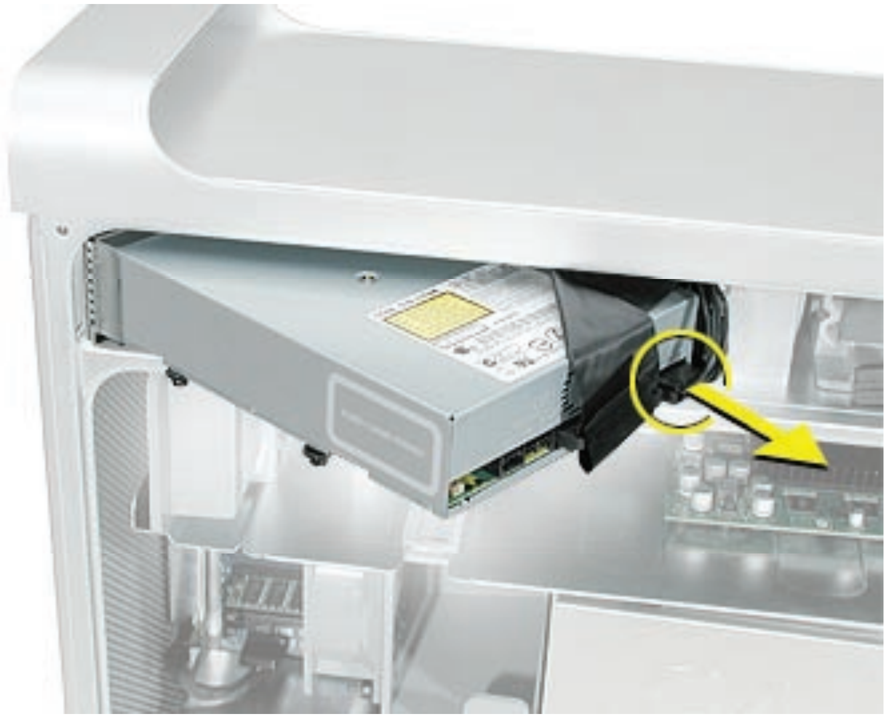
2. Push the optical drive levers out to release the drive.



3. Place the fingers on one hand inside the opening for the optical drive cable and push the edge of the drive forward. The drive will move part way out of the media shelf.



4. Disconnect the power cable from the drive.

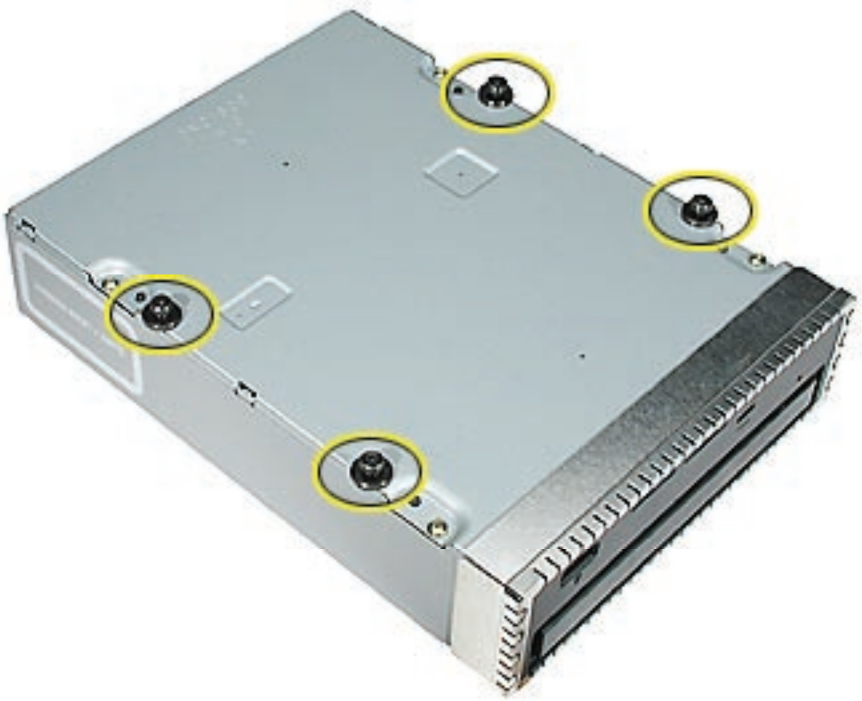


5. Route the drive ribbon cable out through the opening in the media shelf and remove the drive and ribbon cable from the computer.

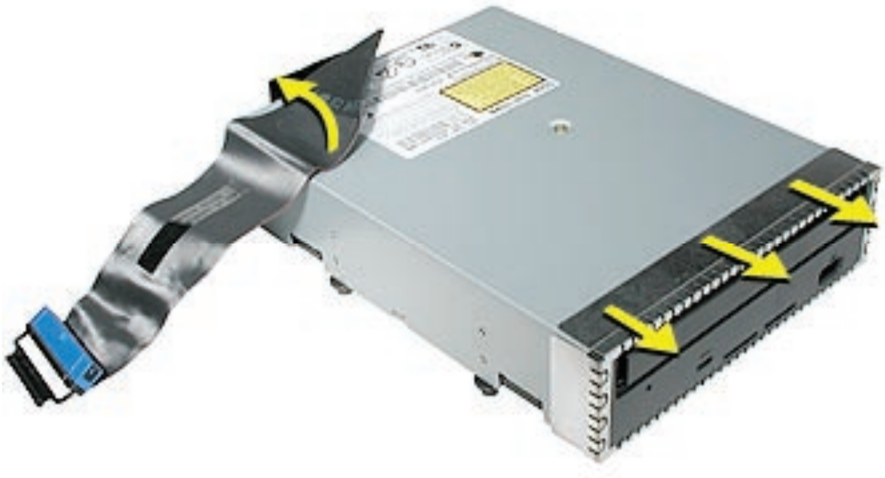
6. If you are replacing the drive with a new drive, install the standoffs on the bottom of the new drive.

   Note for SuperDrives: Two bags of standoffs are included with each drive. Use the standoffs with a Phillips head on Sony drives; use the standoffs with a hex head on Toshiba and Pioneer drives.

   Note for Combo Drives: Use only the standoffs that are included with the new drive. Do not transfer the standoffs from the original drive to the replacement drive.



7. Disconnect the ribbon cable from the back of the drive, and then carefully pry the cable from the top of the drive. Transfer the cable to the top of the replacement drive, and connect the cable to the drive.
   Note: Reusable adhesive tape on the underside of the cable attaches the cable to the drive. When removing the cable from the original drive, be careful to keep the tape with the cable.



8. Carefully remove the EMI shield from the front of the original drive and transfer it to the front of the replacement drive.

Replacement Note: Insert the optical drive part way into the optical drive bay, and connect the power cable to the drive. Then bend down the free end of the ribbon cable, route it through the opening at the back of the media shelf, and connect the cable to the logic board.

Front Inlet Fan(s)

The front inlet fan assembly consists of one or two fans in a plastic bracket. If the computer is a uniprocessor, the assembly contains a single fan; if the computer is a dual processor, the assembly contains two fans connected by a single cable.

You must remove the front inlet fan assembly to access many other parts within the computer. For this access, remove the bracket with the fans attached. You will have to remove the fans from the bracket only if you are replacing the fans themselves.

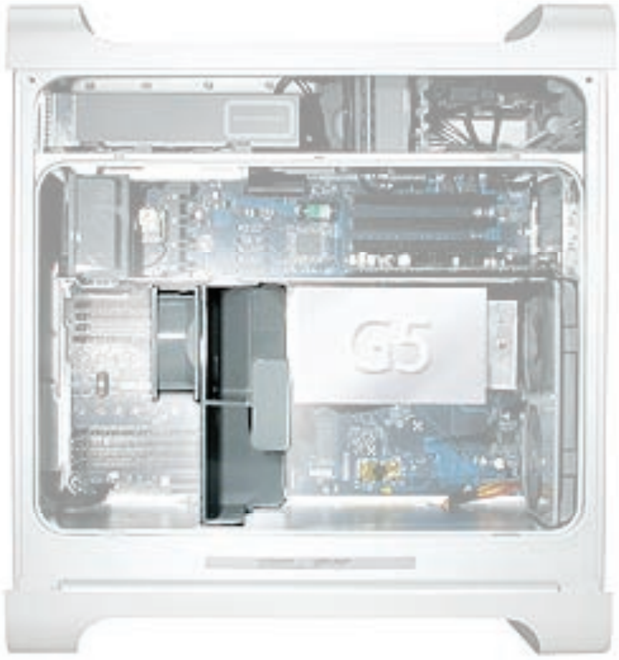
Tools

The only tool required for this procedure is needlenose pliers.

Preliminary Steps

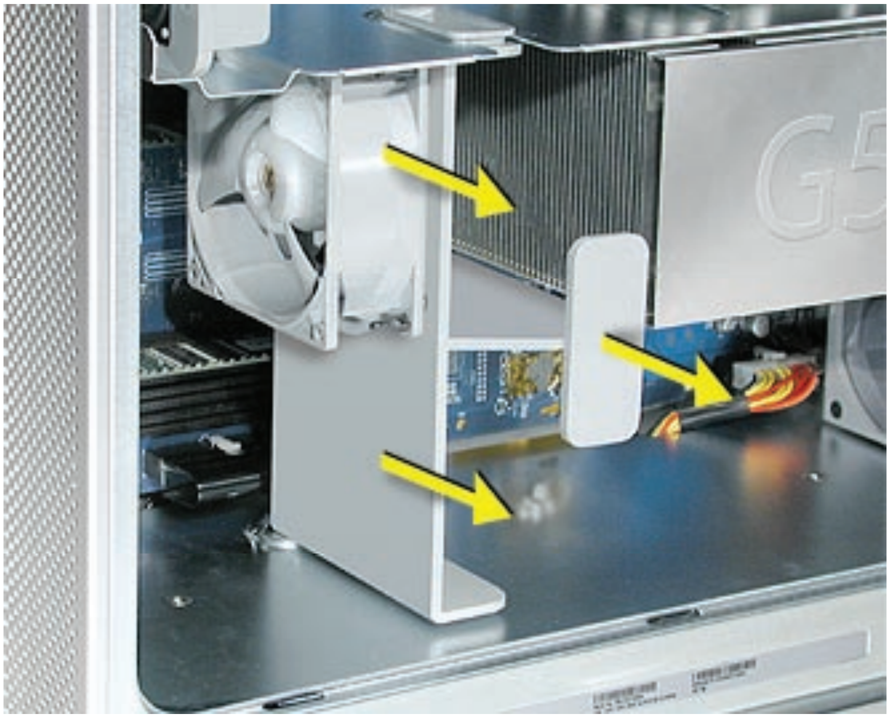
Before you begin, open the computer and lay it on its side with the access side facing up.

Part Location



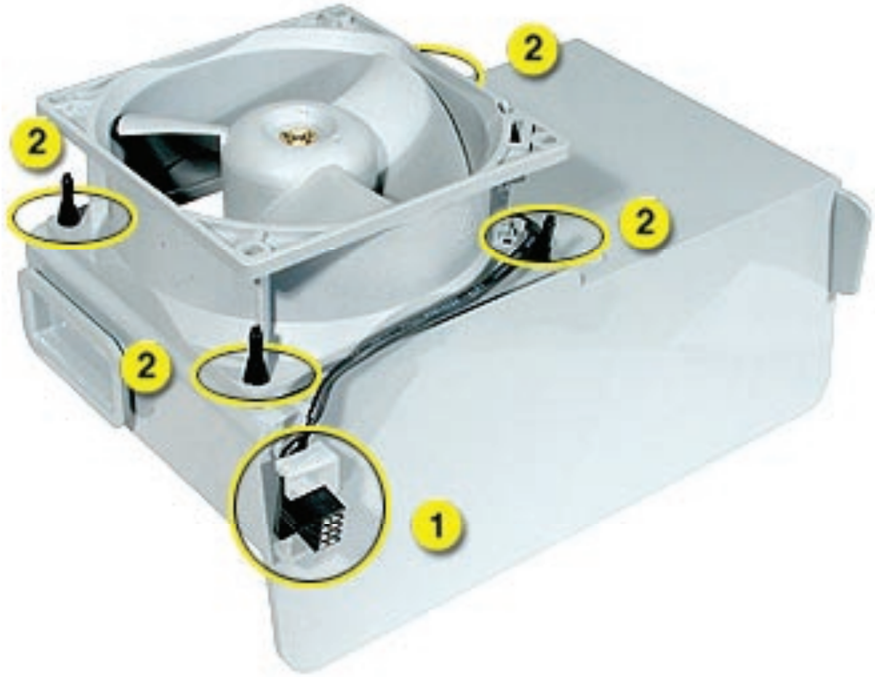
Procedure

1. Hold the front inlet fan assembly by the front handle and firmly pull it out of the computer.



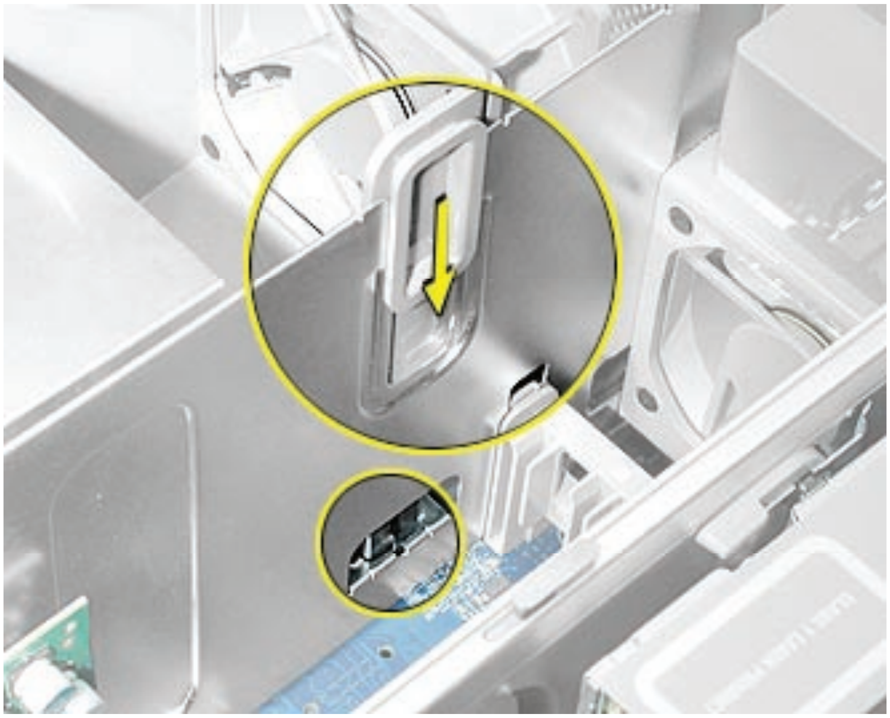
2. If you are replacing the fan(s) in the bracket, do the following:
   - Remove the fan cable from the cable guide.
   - Using needlenose pliers, pull the fan(s) off the grommet fasteners, and remove the fan(s) and cable from the bracket.

   Important: If you are replacing two fans, be careful that you do not separate the fans from each other. They are connected by a common cable.



Replacement Note: To replace the front inlet fan bracket in the enclosure, align the large rail on the bracket with the cutout in the PCI divider and press firmly.

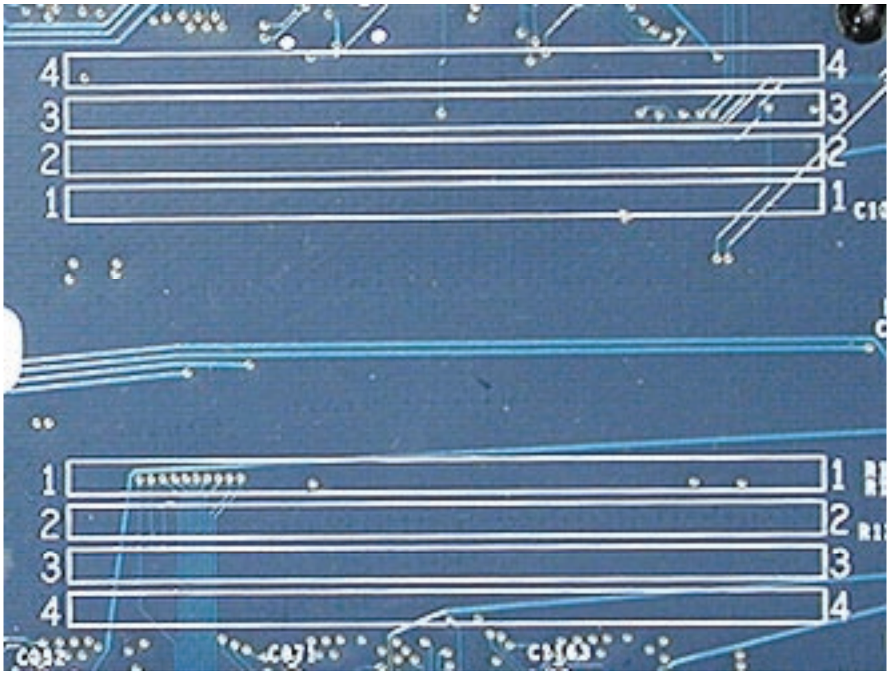
Important: Make sure the connector on the fan fully engages the fan connector on the logic board, or the computer will not operate properly. Gently pull the fan assembly to test whether it is connected.



Memory (DIMMs)

Depending on the model, Power Mac G5 computers have either four or eight Dual Inline Memory Module (DIMM) slots arranged in two banks. The slots accept Double-Data-Rate (DDR) Synchronous Dynamic Random-Access Memory (SDRAM) devices.

The computers ship with a minimum of 256 MB of RAM, provided by a pair of 128 MB DIMMs installed in slot 1 of each DIMM bank. You can add DIMMs, provided they are installed in pairs of equal size, one per bank, from the center outward. A diagram marked on the logic board near the DIMM slots illustrates how the pairs must be installed.



To determine the types of DIMMs to install, refer to the table below:

DIMM Slots	DIMM speed	Maximum amount
4	333 MHz, PC 2700	up to 4 GB
8	400 MHz, PC 3200	up to 8 GB

In addition, DIMMs must fit these specifications:

- 2.5 volt
- 184-pin module
- Maximum number of memory devices on DDR SDRAM:16.
- Nonparity
- No error correcting codes (ECC)
- Unbuffered (registered or buffered DDR SDRAM cannot be used)

Important: Always install DIMMs in pairs of equal size. Memory from older computers is not compatible with the Power Mac G5. Do not use older memory, even if it fits into the DIMM slots.

Note: The Power Mac G5 (June 2004/Early 2005) models support only 184-pin, 2.5 volt, DDR400-compliant (PC3200) DRAM DIMMs with a maximum of 4 GB or 8 GB depending on the configuration.

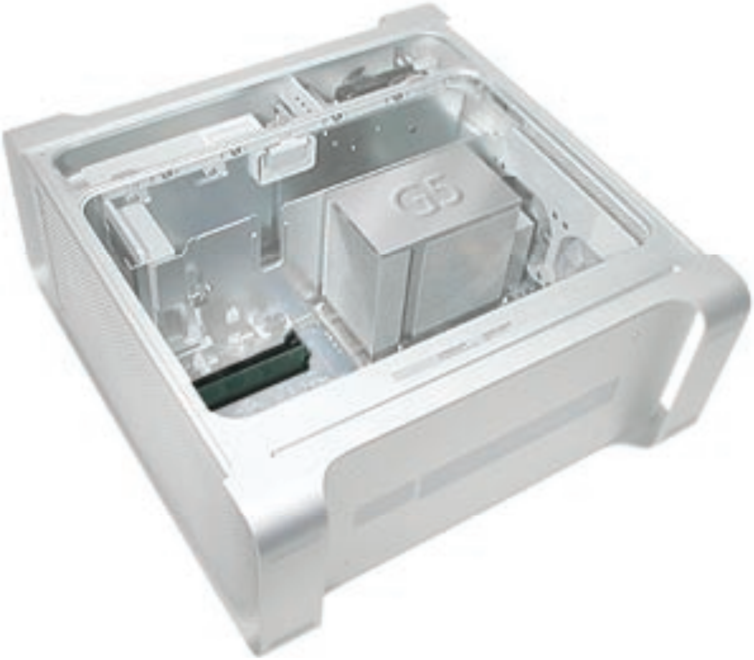
Tools

No tools are required for this procedure.

Preliminary Steps

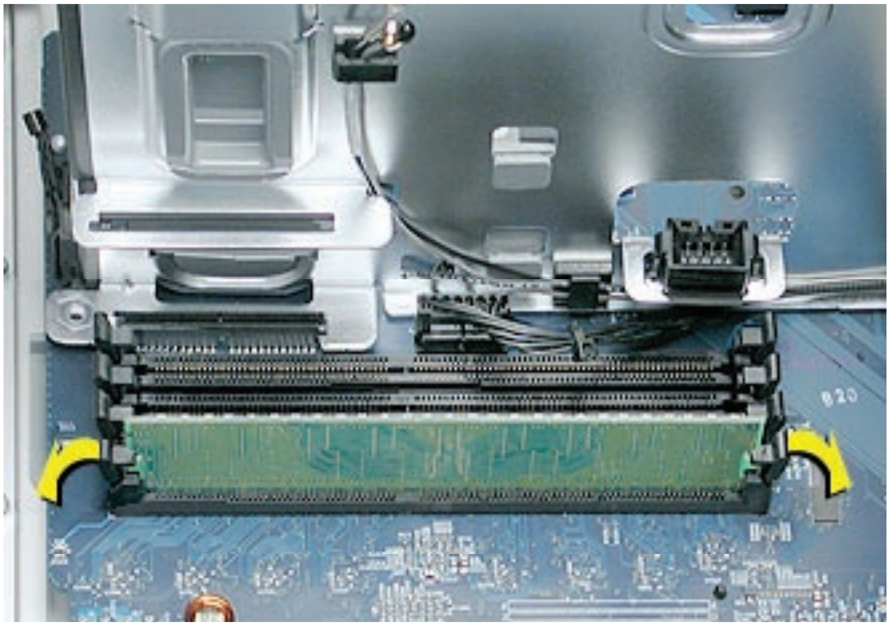
Before you begin, open the computer, lay it on its side with the access side facing up, and **remove the front inlet fan assembly**.

Part Location

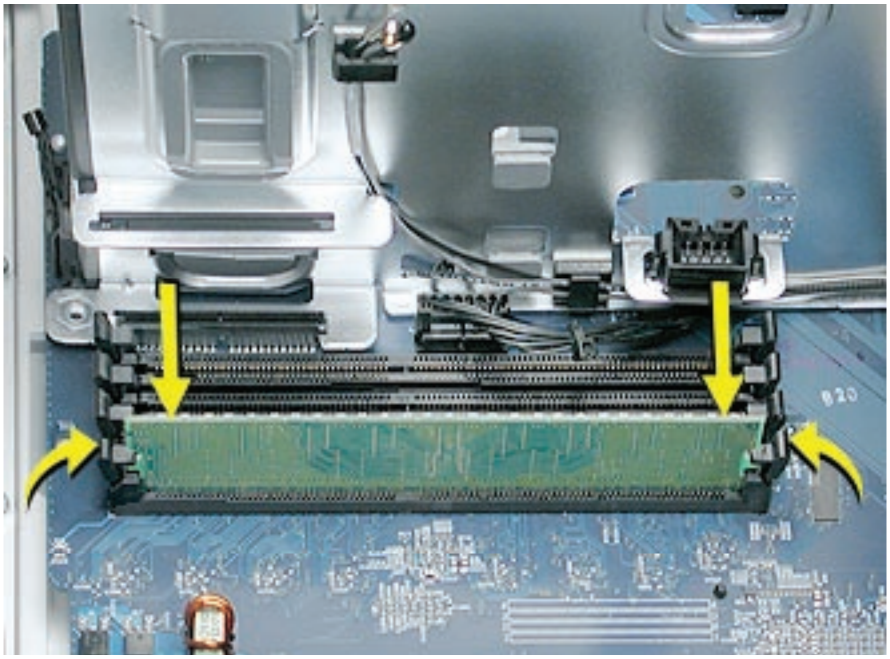


Procedure

1. 1. Locate the DIMM slots on the logic board.
2. 2. Open the ejectors on the DIMM slot by pushing them out to the sides.
3. 3. Holding the DIMM by both top corners, lift it straight up out of the computer.



Replacement Note: Align the DIMM in the slot and push both ends of the DIMM down until the tabs are vertical and the ejectors snap into place.

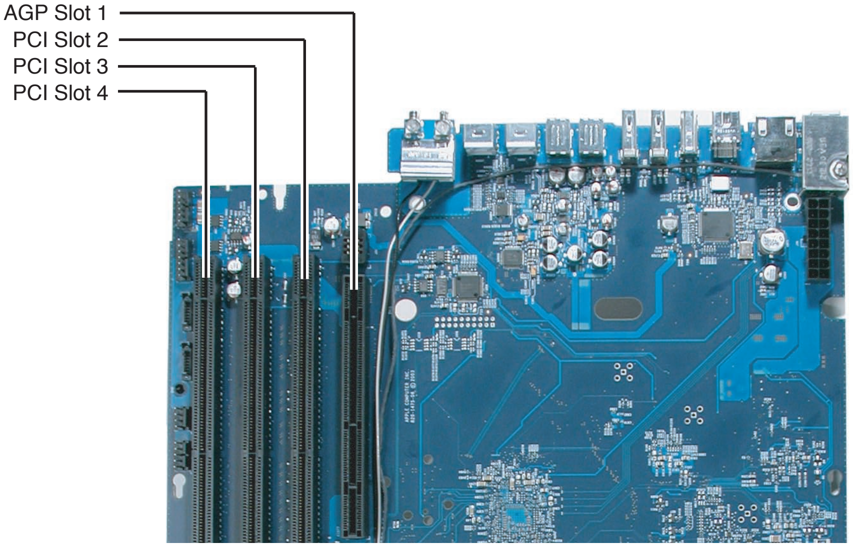


Important: Do not touch the DIMM connectors. Handle the DIMM only by the edges.

AGP/PCI Card

The Power Mac G5 computer has four expansion card slots, three of which accommodate Peripheral Component Interconnect (PCI) cards and one that accepts an advanced graphics port (AGP) video card. AGP cards and PCI cards have different connectors, so you cannot insert a PCI card into the AGP slot.

Note: Maximum power consumption for all four expansion slots (the three PCI expansion cards and the AGP card) should not exceed 90 watts (W).



AGP Cards

The AGP video card, installed in slot 1, contains the graphics processor unit (GPU) and provides the computer's display ports. Slot 1 is designed specifically to accept AGP cards.

Note: If certain high-end video cards are installed in the AGP slot, the cards block the adjacent PCI/PCI-X slot (slot 2). As a result, you can install PCI/PCI-X cards in slots 3 and 4 but not in slot 2. For specific card information, see the video card table in the "Video" topic in the Basics chapter.

The Power Mac G5 (June 2004/Early 2005) models have the accelerated graphics port (AGP 8x Pro) bus. It's an enhanced PCI bus with extra functionality that is up to 8 times faster than a 66 MHz PCI port. The computer comes with a graphics card installed in the AGP 8x Pro slot and has ADC and DVI-I connectors or dual DVI-I connectors. The AGP bus is 1.5 V only and is not backward compatible. Older AGP cards will not work in these models.

PCI Cards

The remaining three expansion slots, labeled 2, 3, and 4, accommodate PCI cards up to 12 inches long. Depending on the Power Mac G5 model, you can install either PCI or PCI-X cards.

Note: To determine if a Power Mac G5 computer can accommodate PCI-X cards, check the number of DIMM slots on the logic board. Computers with four DIMM slots have 33 MHz PCI slots and cannot use PCI-X cards; computers with eight DIMM slots can accommodate 100 and 133 MHz PCI-X cards. See the chart below.

Card type	PCI slot	Card speed
PCI*	slots 2, 3, and 4	64-bit, 33 MHz
PCI-X	slots 2 and 3	64-bit, 100 MHz
PCI-X	slot 4	64-bit, 133 MHz

*The PCI slots can accommodate mixed-voltage (5.0 V, 12 V, or 3.3 V) cards but only at 3.3 V signaling, with 32-bit or 64-bit data widths and a 33 MHz frequency. You can add a 66 MHz card to a 33 MHz PCI slot if the card can operate at the lower 33 MHz rate.

Warning: Do not use PCI cards that function only at 66 MHz in the PCI slots. Damage to the equipment could result. If you are installing an additional 66 MHz PCI card, rather than replacing an existing PCI card like-for-like, check with the card's manufacturer to see if the new 66 MHz card also works at 33 MHz.

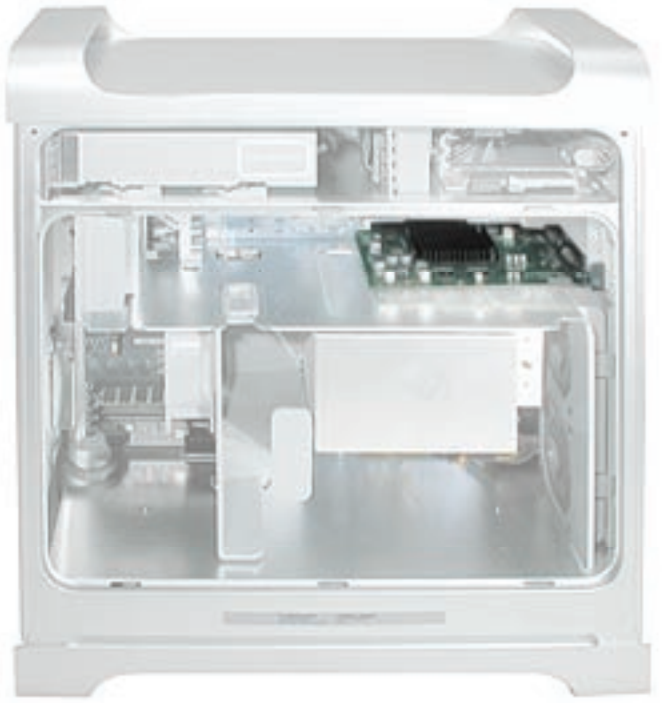
Tools

The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

Before you begin, open the computer and lay it on its side with the access side facing up.

Part Location

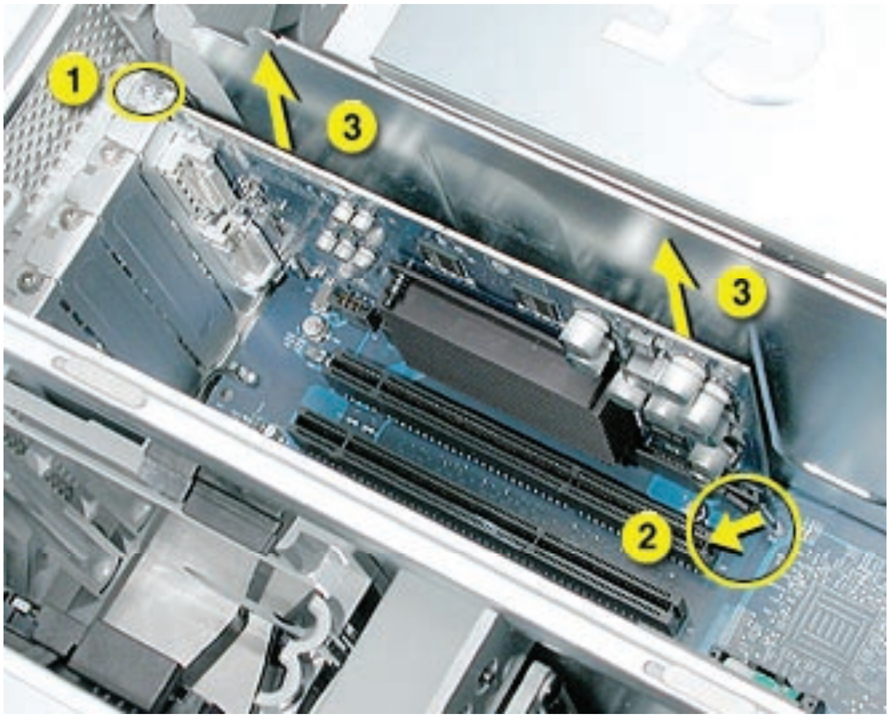


Procedure

Install an AGP video card in slot 1 only. Install either PCI or PCI-X cards in the slots labeled 2, 3, and 4.

Warning: When removing or installing a PCI or AGP card, handle it only by the edges. Do not touch its connectors or any of the components on the card. Lift the card straight out from the connector to remove it, and insert it straight into the connector to install it. Do not rock the card from side to side and don't force the card into the slot. Once the replacement card is installed, pull on it gently to check that it is properly connected.

1. Remove the screw that mounts the card to the enclosure.
2. If you are removing an AGP card, pull back the small locking clip at the front of the AGP connector.
3. Holding the card by the top corners, gently pull up the card and remove it from its expansion slot.



Replacement Note: Align the card's connector with the expansion slot and press until the connector is inserted all the way into the slot. If you're installing a 12-inch card, make sure the card engages the appropriate slot in the PCI card guide.

- Don't rock the card from side to side; instead, press the card straight into the slot.
- Don't force the card. If you meet a lot of resistance, pull the card out. Check the connector and the slot for damage or obstructions, then try inserting the card again.
- Pull the card gently to see if it is properly connected. If it resists and stays in place, and if its gold connectors are barely visible, the card is connected.

AirPort Extreme Card

Only the AirPort Extreme Card may be installed in the Power Mac G5. Older AirPort Cards do not work in this computer.

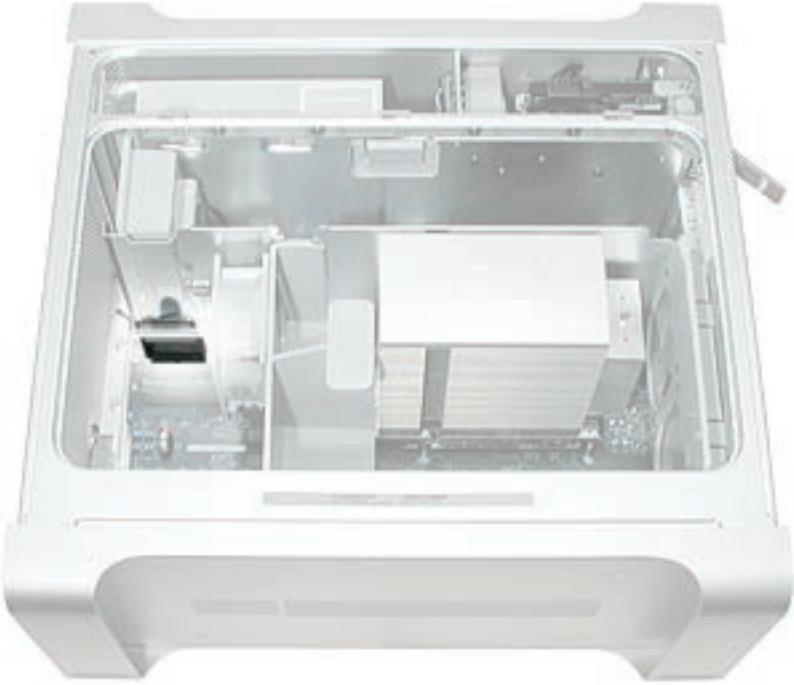
Tools

No tools are required for this procedure.

Preliminary Steps

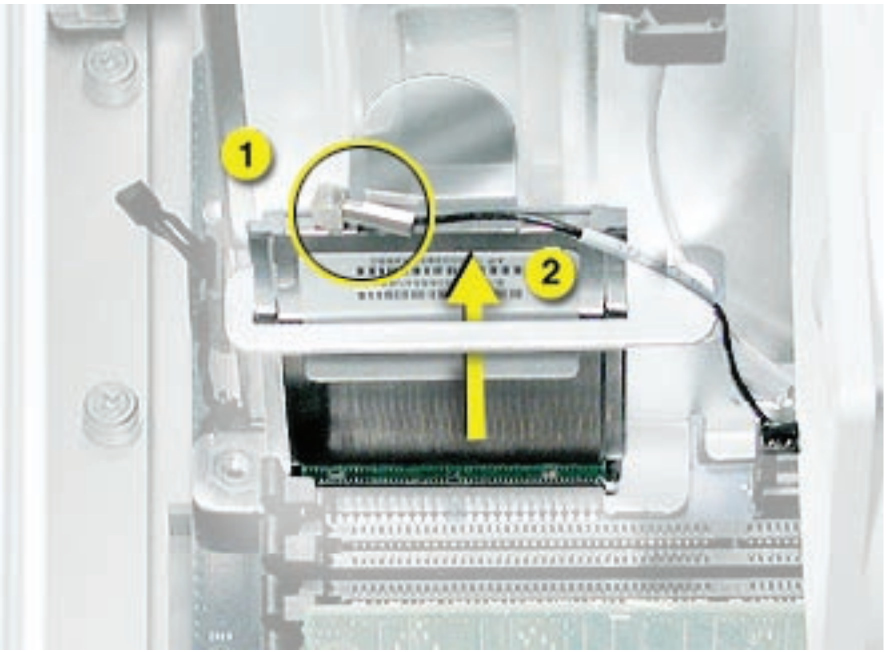
Before you begin, open the computer and lay it on its side with the access side facing up.

Part Location



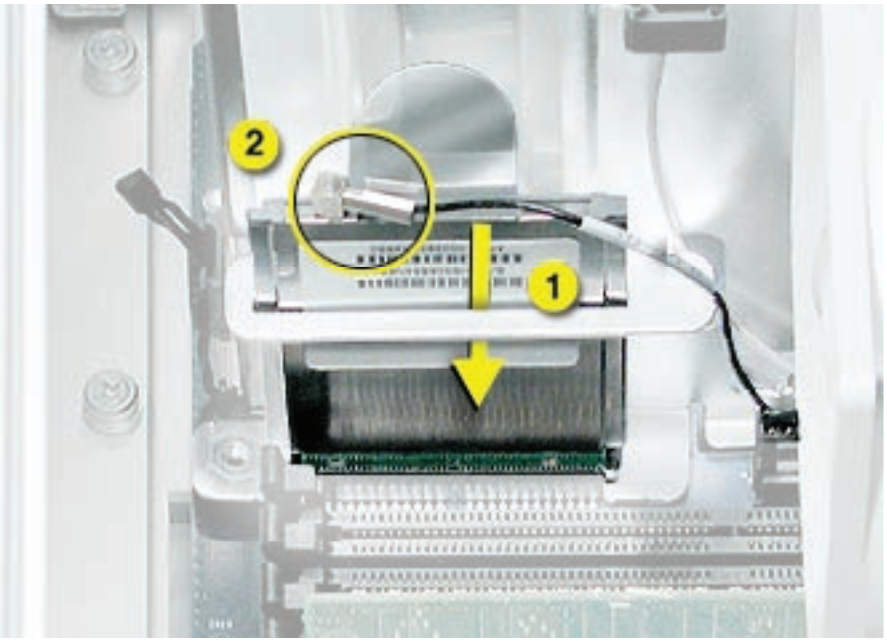
Procedure

1. Carefully disconnect the antenna cable from the end of the AirPort Extreme Card.
2. Pull the card straight back out of the enclosure.



Replacement Note: Position the AirPort Extreme Card with the ID numbers and barcode facing the bottom case and insert the card into the AirPort Extreme Card connector.

Important: Be sure to reconnect the antenna cable to the card.



Battery

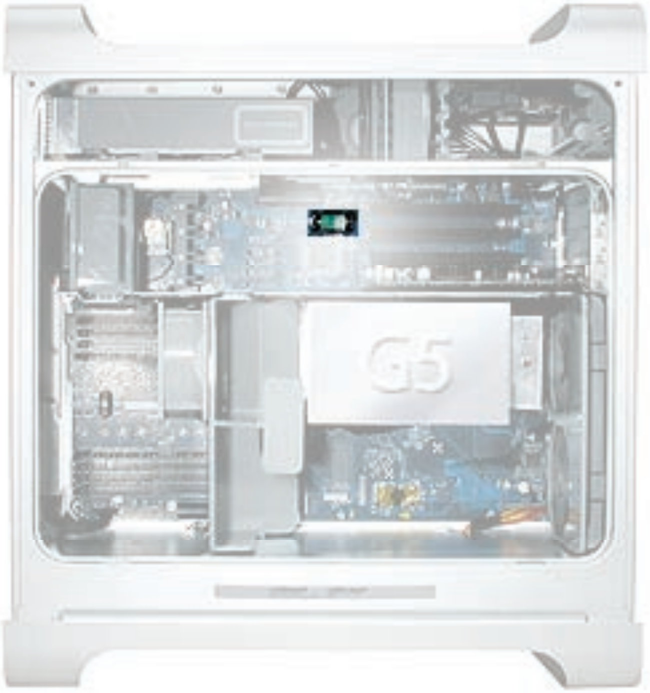
Tools

No tools are required for this procedure. You may, however, find a flat-blade screwdriver useful in removing the battery from its holder.

Preliminary Steps

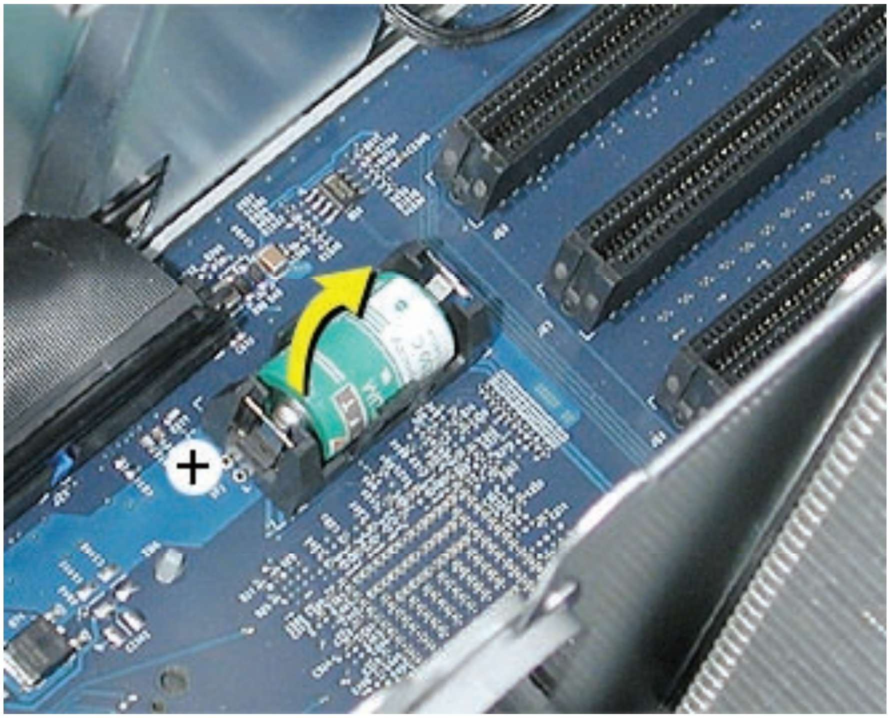
Before you begin, open the computer and lay it on its side with the access side facing up. If a PCI card is installed in the slot next to the battery, remove the card.

Part Location



Procedure

1. If necessary, carefully spread the tabs holding the battery.
2. Remove the battery from its holder, noting the orientation of the battery's positive end. (A plus sign is marked on or near the battery holder.)



Replacement Note: Insert the new battery in the holder, making sure the battery's positive symbol aligns with the positive symbol on or near the holder.

Warning: Installing the battery incorrectly may cause an explosion. Be sure the battery's positive and negative poles are correctly oriented in the holder. Use only the same type of battery or an equivalent recommended by the manufacturer of the original.

Important: Batteries contain chemicals, some of which may be harmful to the environment. Please dispose of used batteries according to your local environmental laws and guidelines.

PCI Card Guide

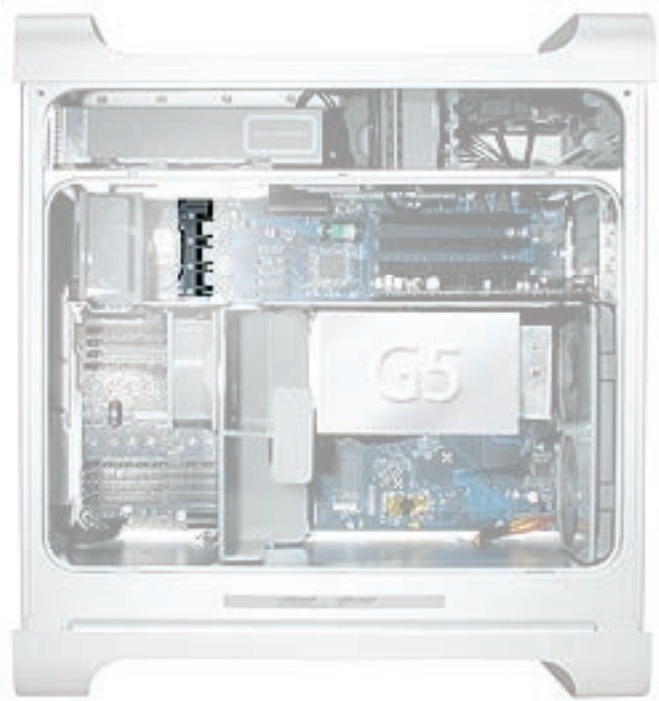
Tools

The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

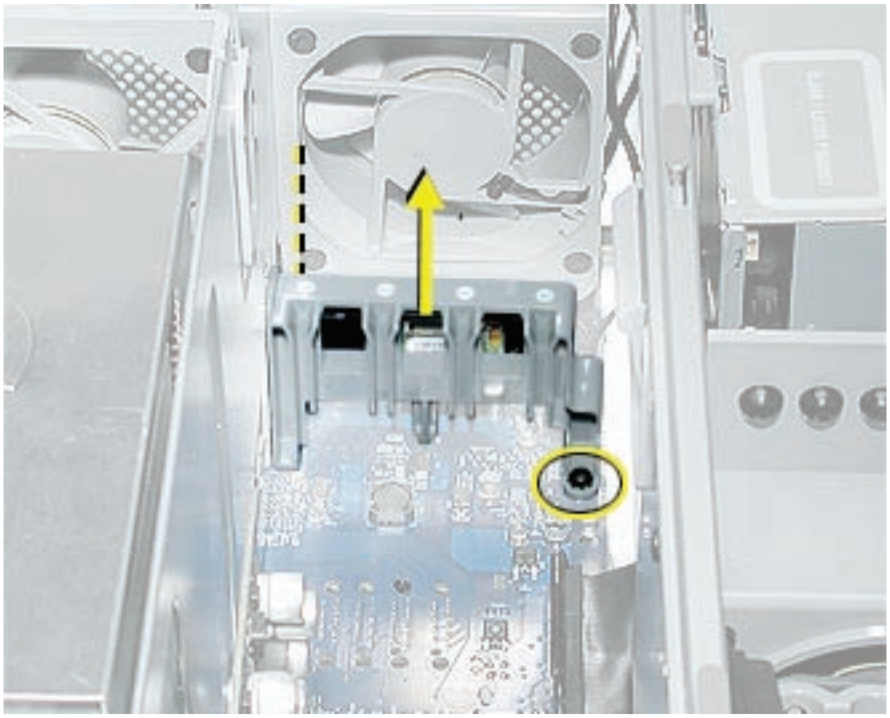
Before you begin, open the computer and lay it on its side with the access side facing up.

Part Location



Procedure

1. Remove the two screws that mount the PCI card guide to the logic board.
2. Slide the card guide up to release the two latches from the PCI divider, and remove the card guide from the enclosure.



Speaker/Fan Assembly

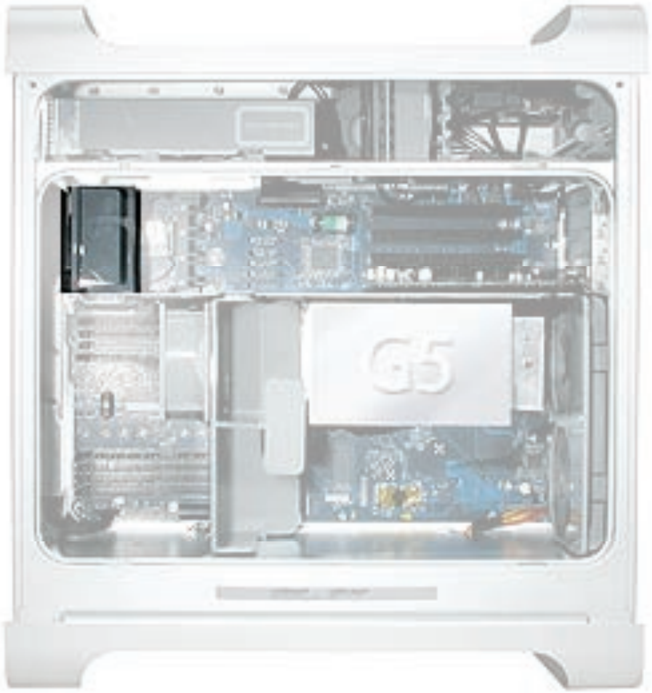
Tools

The only tools required for this procedure are a Phillips screwdriver and needlenose pliers.

Preliminary Steps

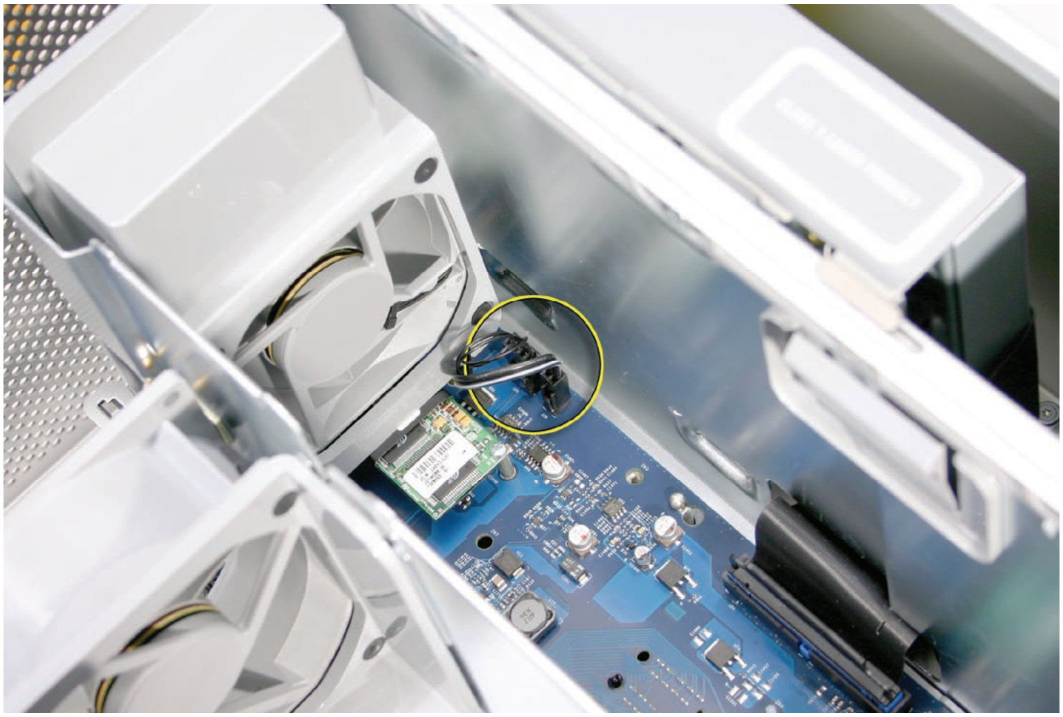
Before you begin, open the computer, lay it on its side with the access side facing up, and remove the PCI card guide.

Part Location

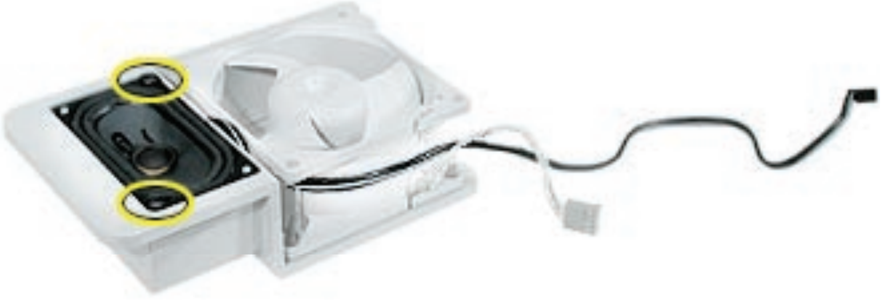


Procedure

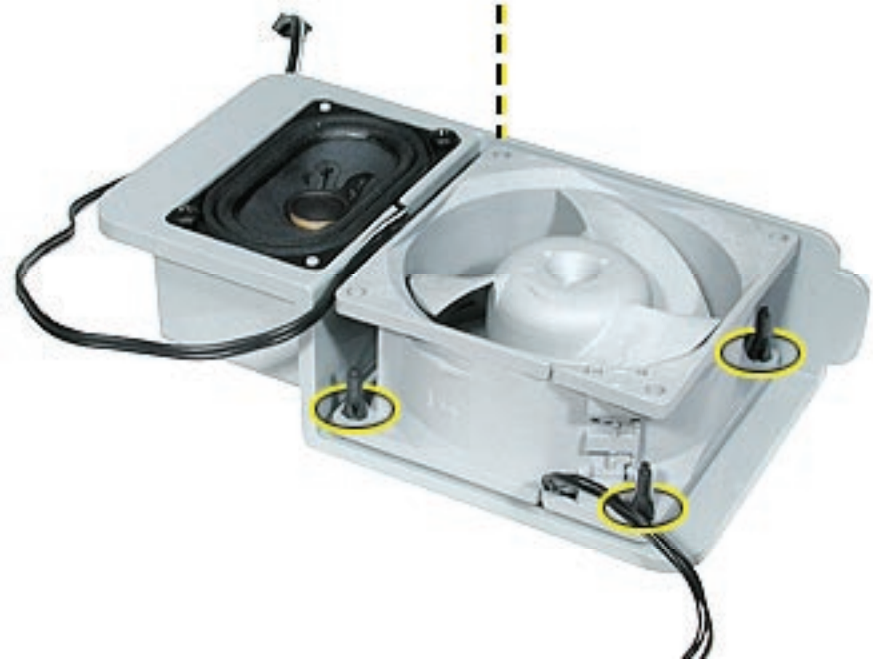
1. Disconnect the speaker and fan cables from the logic board.
2. Lift the speaker/fan assembly straight up and remove it from the enclosure.
   Important: Be careful that the fan and speaker cables do not catch on the PCI divider as you lift the assembly.



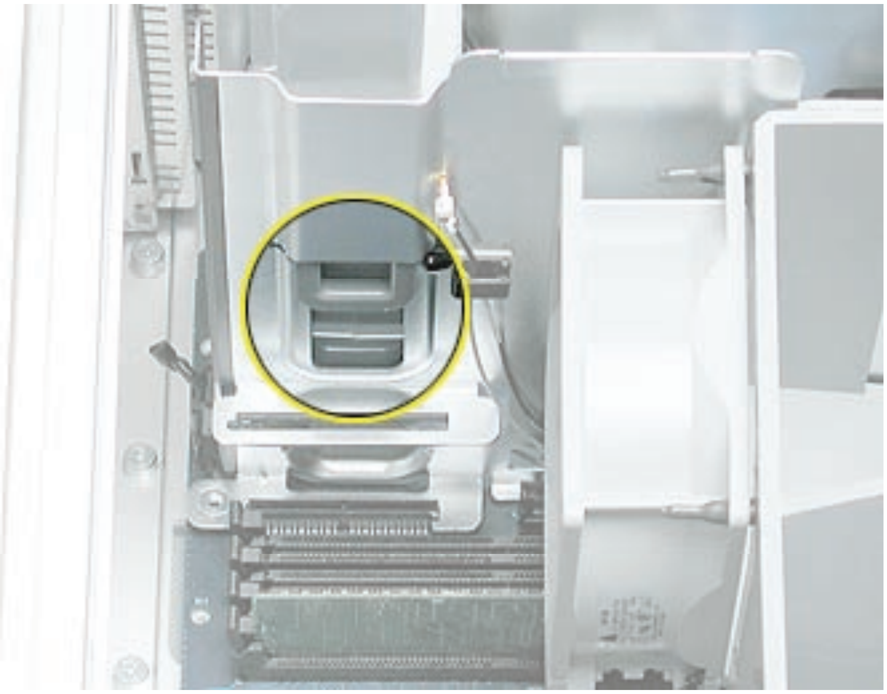
3. If you are replacing the speaker, remove the two screws and remove the speaker from the speaker/fan bracket.



4. If you are replacing the fan, use needlenose pliers to pull the fan off the four grommet fasteners. Then remove the fan from the bracket.



Replacement Note: When reinstalling the speaker/fan bracket in the enclosure, make sure the large tab on the side of bracket engages with the channel in the PCI divider.



Modem: Power Mac G5, Power Mac G5 (June 2004 Dual 1.8 GHz)

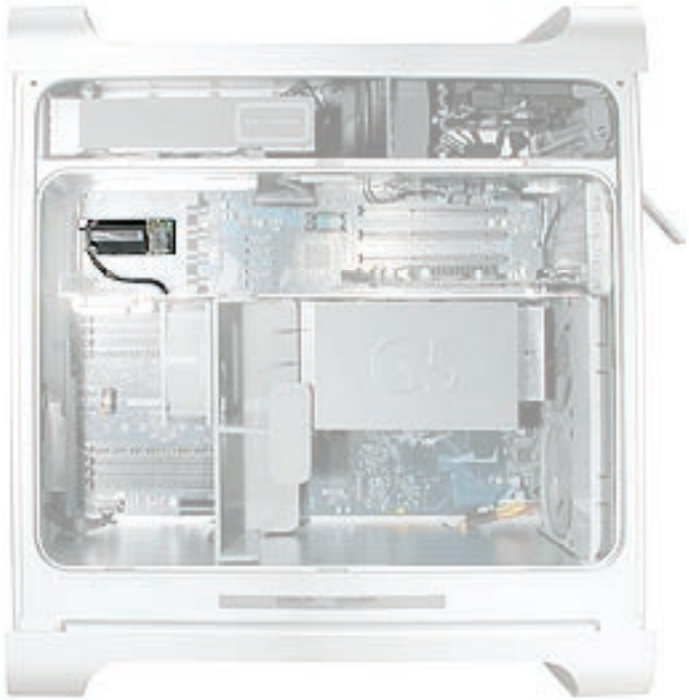
Tools

The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

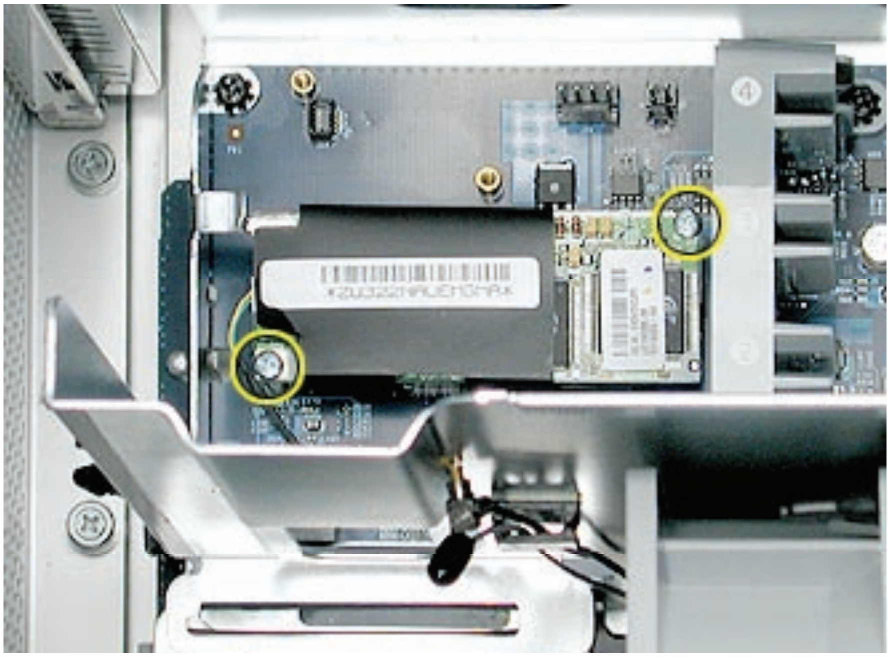
Before you begin, open the computer, lay it on its side with the access side facing up, and remove the speaker/fan assembly.

Part Location

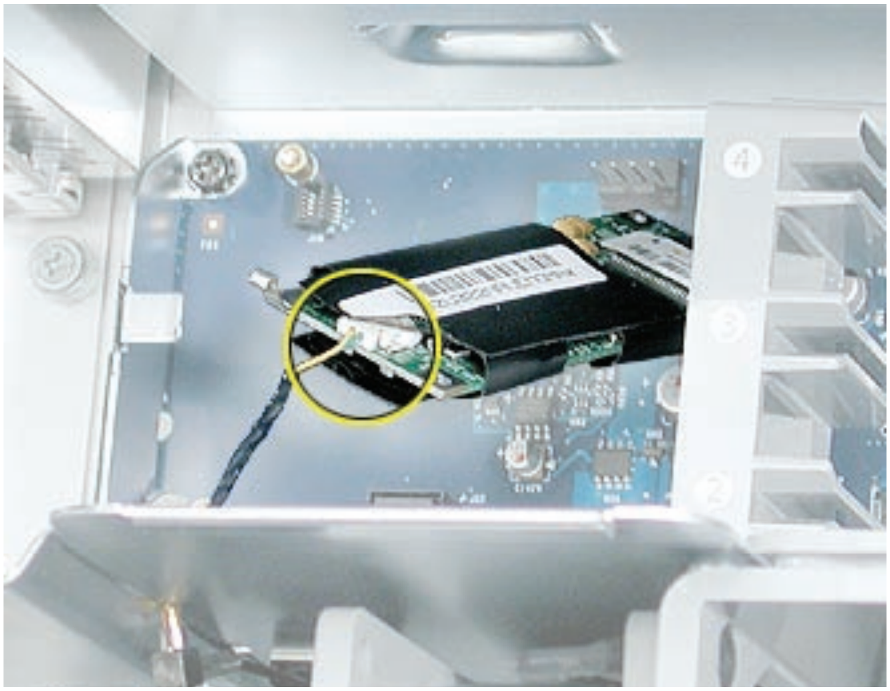


Procedure

1. Remove the two screws that secure the modem board.



2. Lift the board slightly and disconnect the modem filter cable from the modem board.



3. Remove the modem from the enclosure.

Important: Be sure to reconnect the modem filter cable before reinstalling the modem.

Soft Modem: Power Mac G5 (June 2004 Dual 2.0/2.5 GHz), Power Mac G5 (Early 2005)

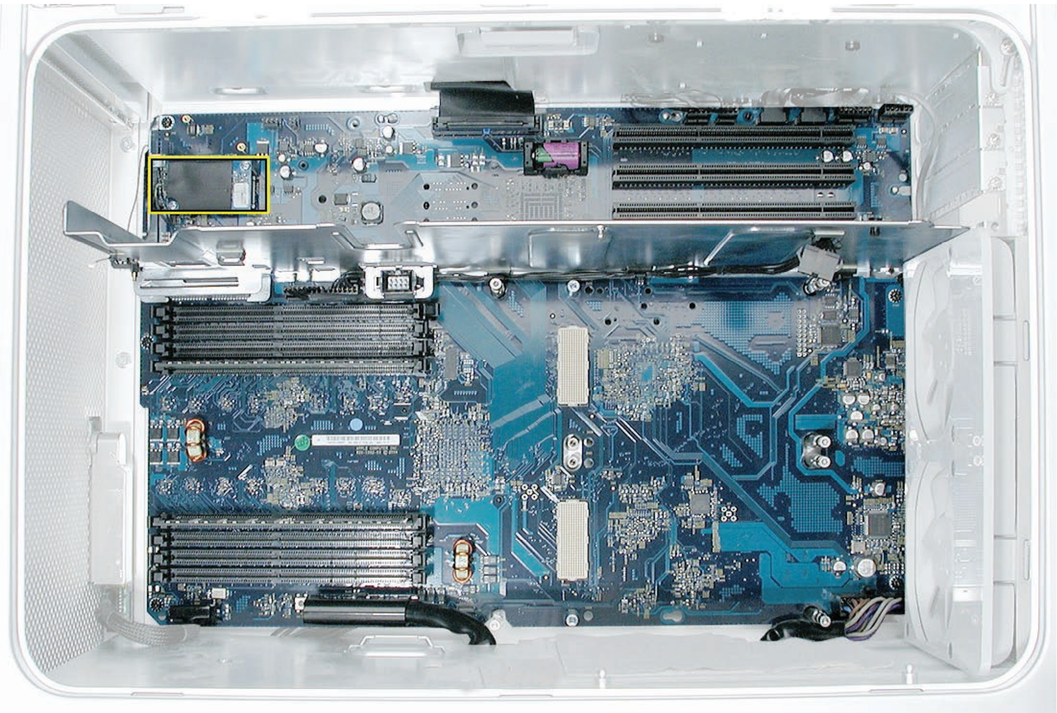
Tools

The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

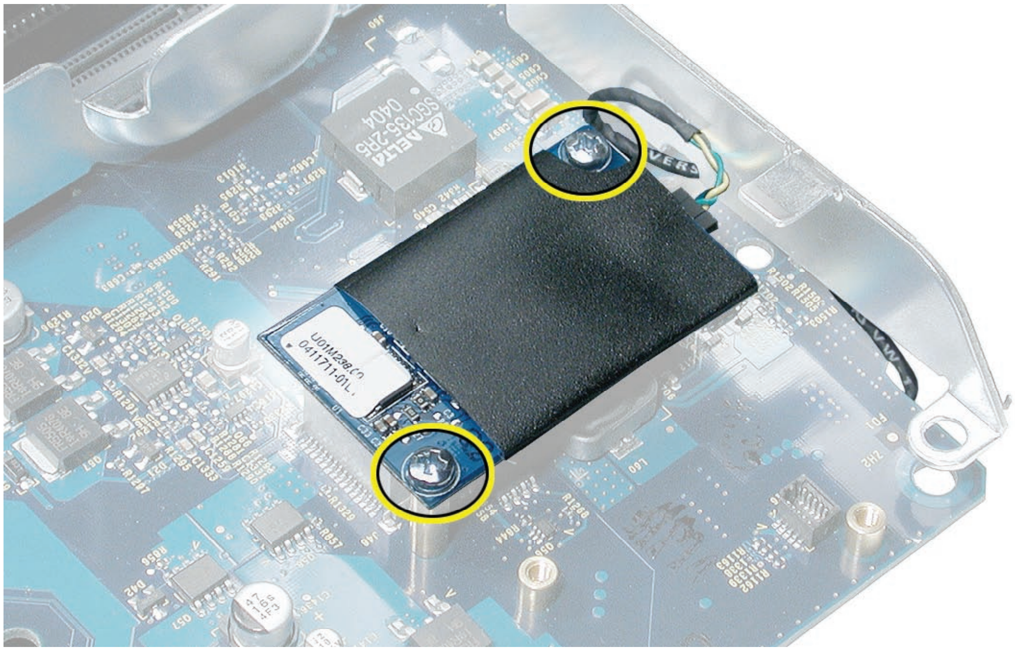
Before you begin, open the computer, lay it on its side with the access side facing up, and remove the speaker/fan assembly.

Part Location



Procedure

1. Remove the two screws that secure the modem board.



2. Disconnect the board from the connector on the logic board. Disconnect the modem filter cable from the modem board.

Bluetooth Card

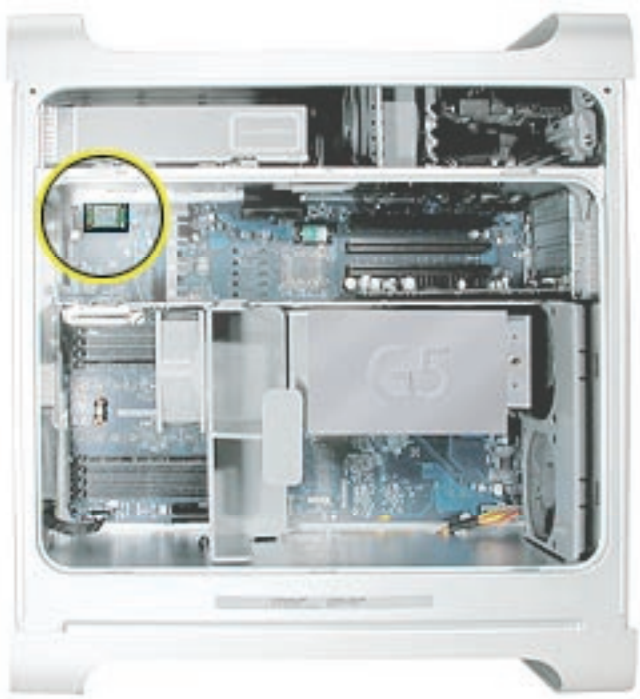
Tools

The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

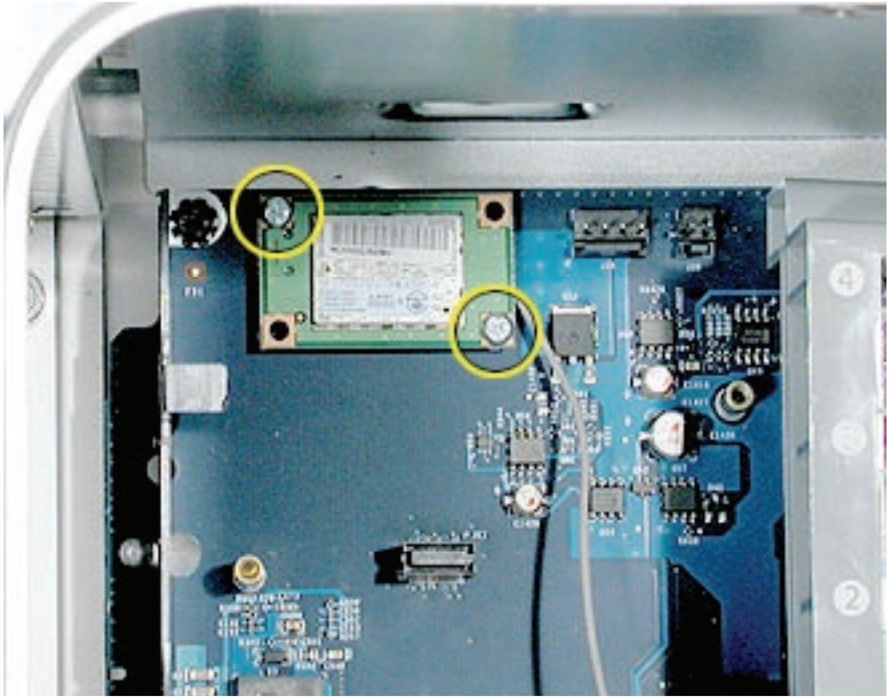
Before you begin, open the computer, lay it on its side with the access side facing up, and **remove the speaker/fan assembly**.

Part Location

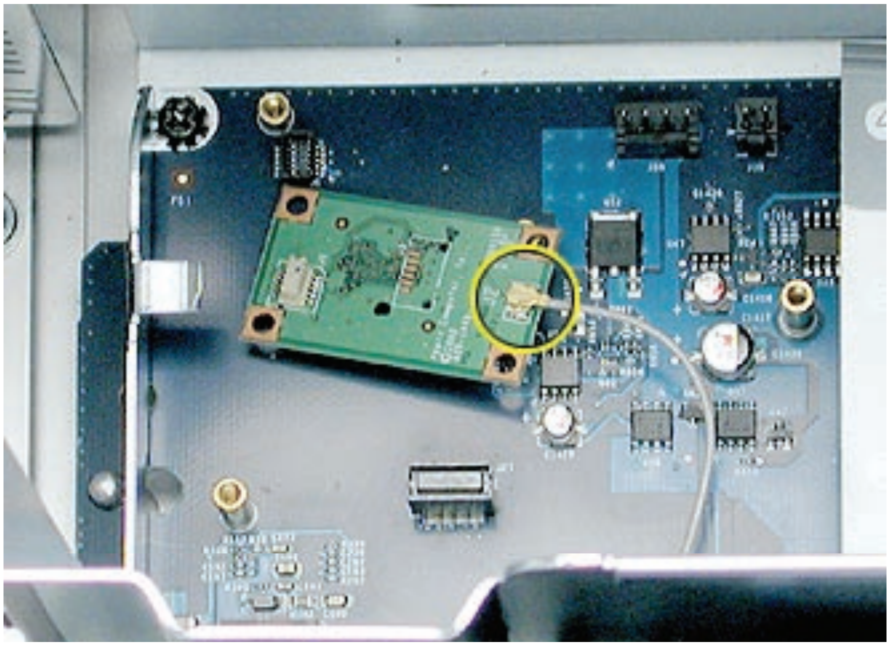


Procedure

1. Remove the two Bluetooth mounting screws.



2. Lift the Bluetooth card straight up a short distance to disconnect it from the logic board. Then turn the card over, and disconnect the Bluetooth antenna cable from the underside of the card.



Replacement Note: Be very careful connecting the antenna cable to the Bluetooth card. The connector is fragile and can easily be bent.

Heatsink Cover: Power Mac G5

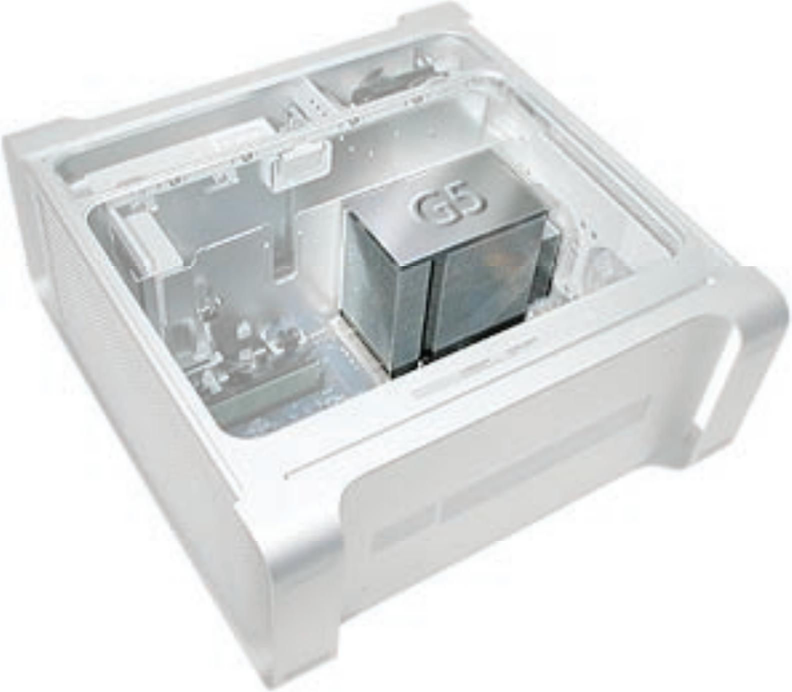
Tools

No tools are required for this procedure.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and **remove the front inlet fan assembly**.

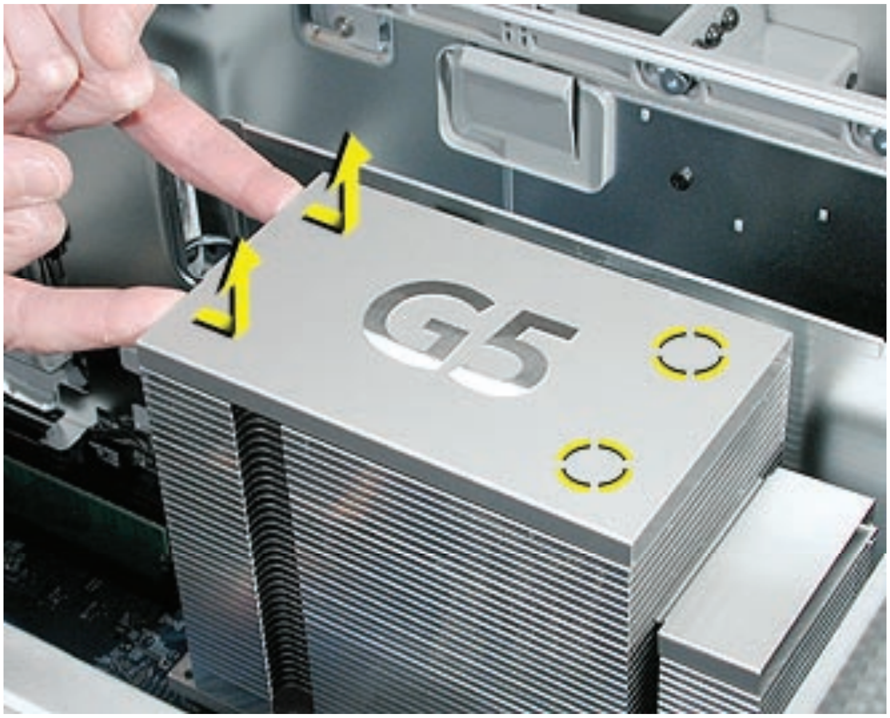
Part Location



Procedure

Note: The heatsink cover is held in place by two sets of small plastic latches on the underside of the cover.

1. Place both index fingers under the edge of the heatsink cover near the "G" and press in on the first set of latches.
2. Release the second set of latches under the opposite edge of the cap and lift the cover off the heatsink.



Heatsink Cover: Power Mac G5 (June 2004/Early 2005)

Tools

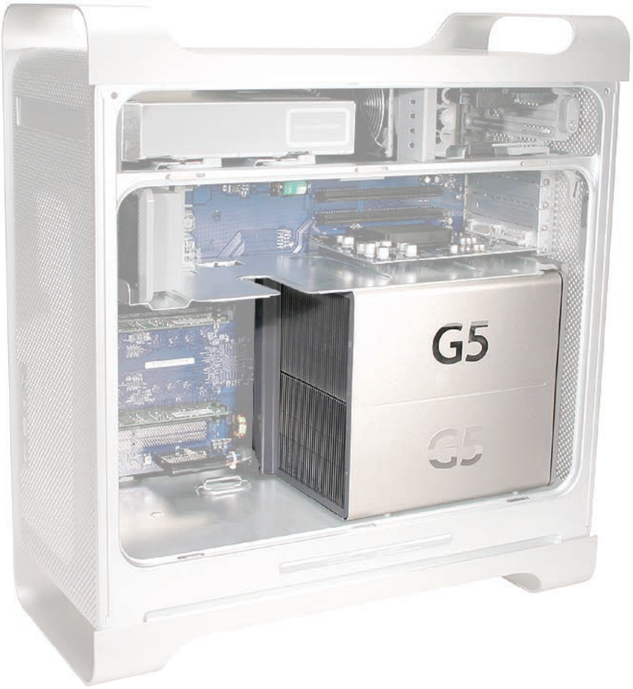
This procedure requires the following tools:

- Mat knife or Xacto knife (to remove locking rivet)
- Cup hook (to remove locking rivet)

Preliminary Steps

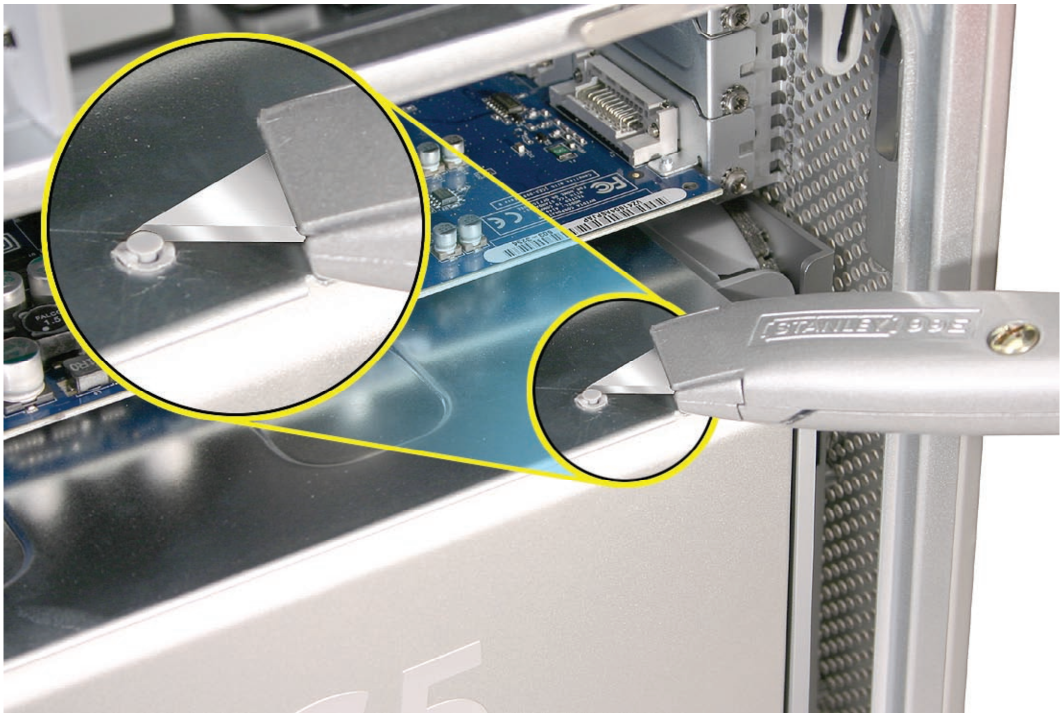
Before you begin, open the computer, lay it on its side with the access side facing up, and **remove the front inlet fan assembly**.

Part Location

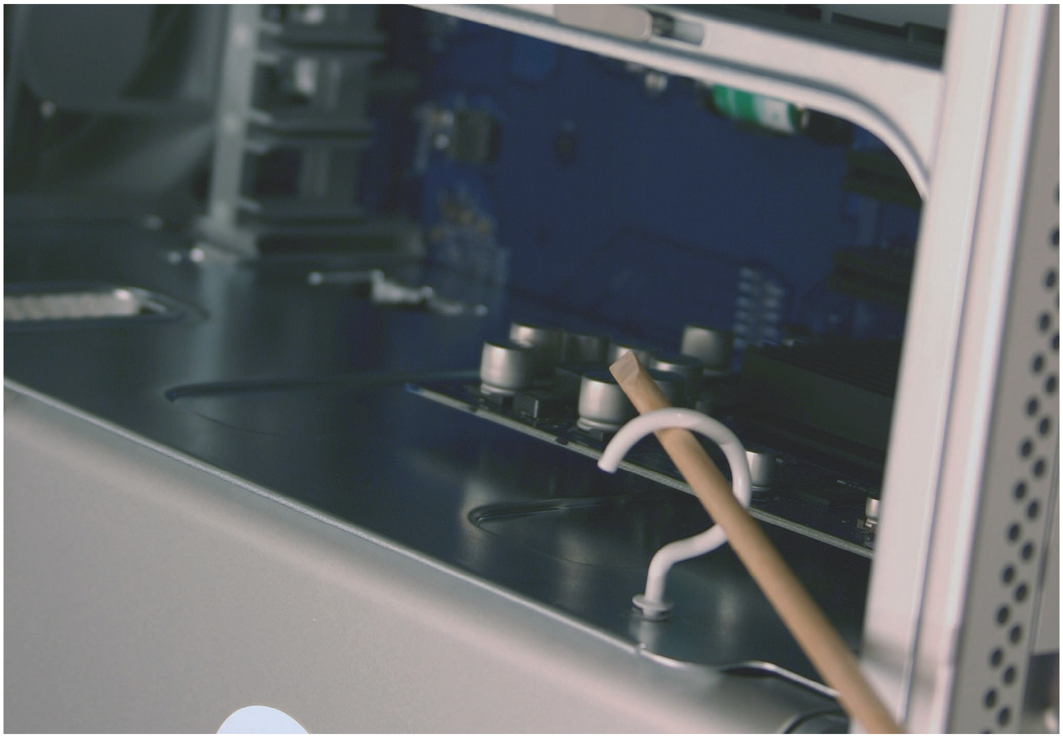


Procedure

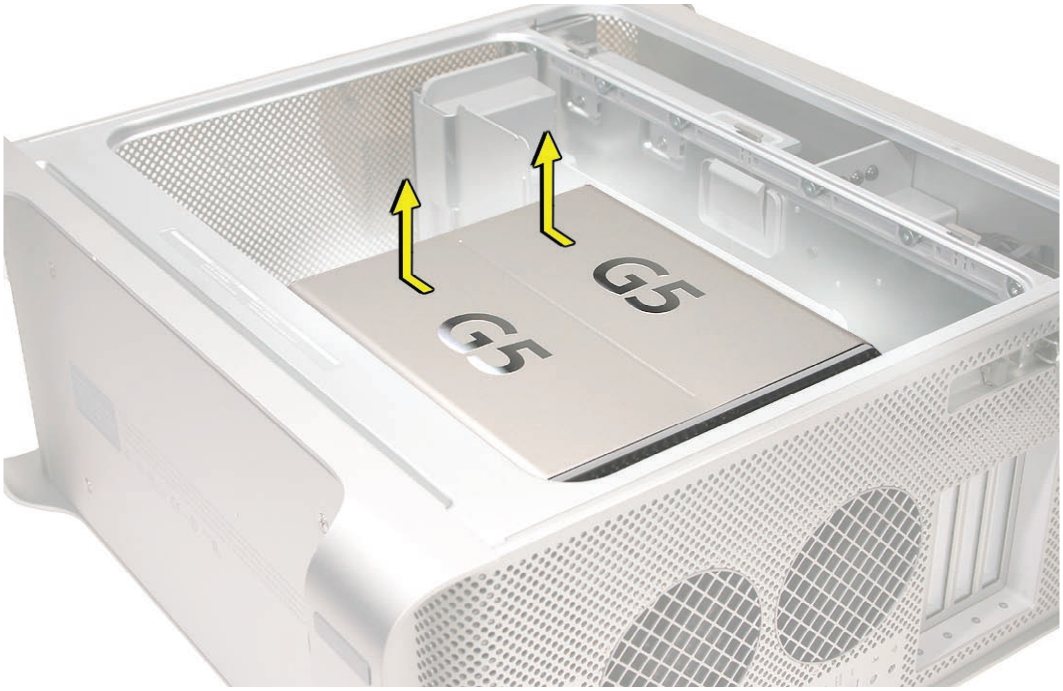
1. Locate the locking rivet that secures the processor heatsink cover to the PCI divider.
2. Using a mat knife or Xacto knife, pry up and remove the plug at the center of the locking rivet. Warning: If you are not certified to service this product, removing the rivet will void the computer's warranty.
   Replacement Note: For Power Mac G5 (June 2004 Dual 1.8/2.0 GHz and Early 2005 Dual 2.0/2.3 GHz) computers, you do not need to replace the rivet after you have replaced the heatsink cover. For Power Mac G5 (June 2004 Dual 2.5 GHz and Early 2005 Dual 2.7 GHz) computers, you must replace the rivet. Extra rivets are available as part number 922-6503.



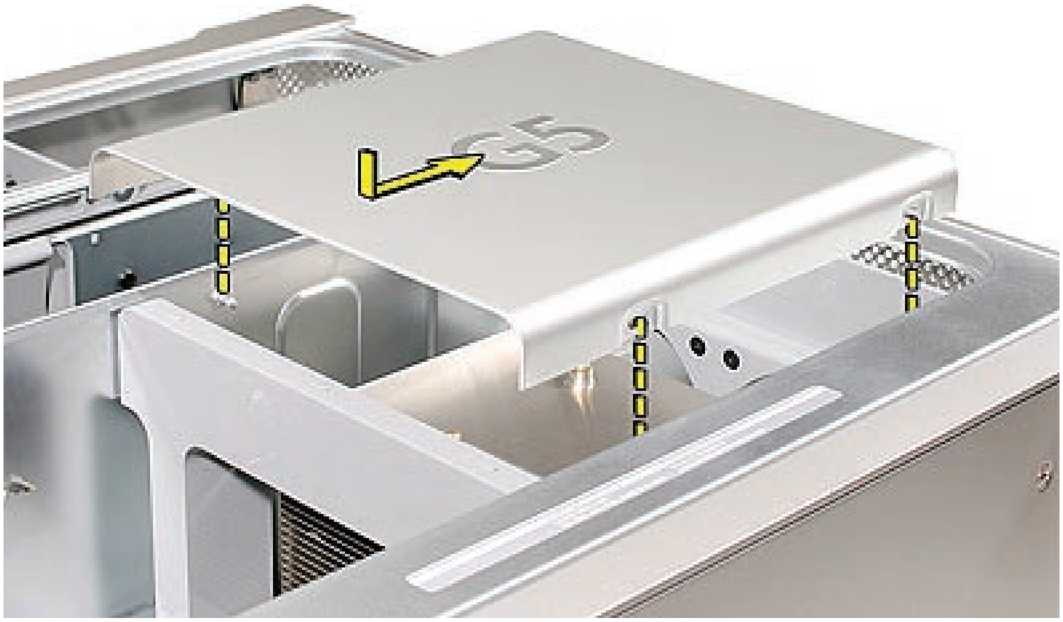
3. Screw a cup hook into the center of the remaining rivet and holding onto the hook, rock the rivet back and forth until you work it out of the heatsink cover. Note: You may find it useful to insert a wooden stick into the hook to help pull out the rivet.



4. Slide the cover to the left to unlatch the four metal latches under the cover. Lift the cover up and off the heatsink.



Replacement Note: Place the notches in the underside of the cover directly over the four mounting pegs. Slide the cover toward the back of the computer and then press down firmly until you feel the cover lock into place.



Processor: Power Mac G5, Power Mac G5 (June 2004 Dual 1.8/2.0 GHz), Power Mac G5 (Early 2005 Dual 2.0/2.3 GHz)

Tools

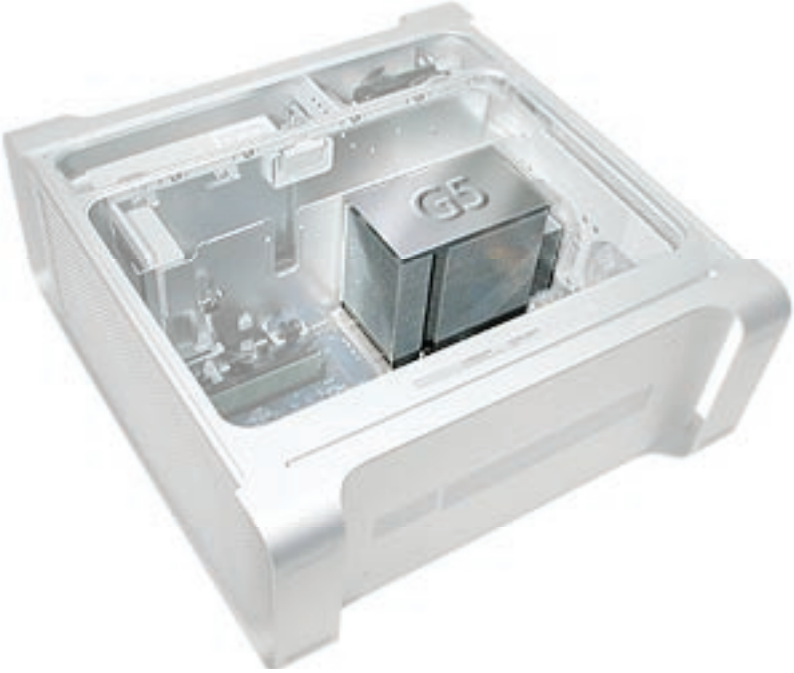
This procedure requires either a long-handled Phillips screwdriver or a long-handled 2.5 mm hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

- Front inlet fan assembly
- Heatsink cover for Power Mac G5 or
- Heatsink cover for Power Mac G5 (June 2004/Early 2005)

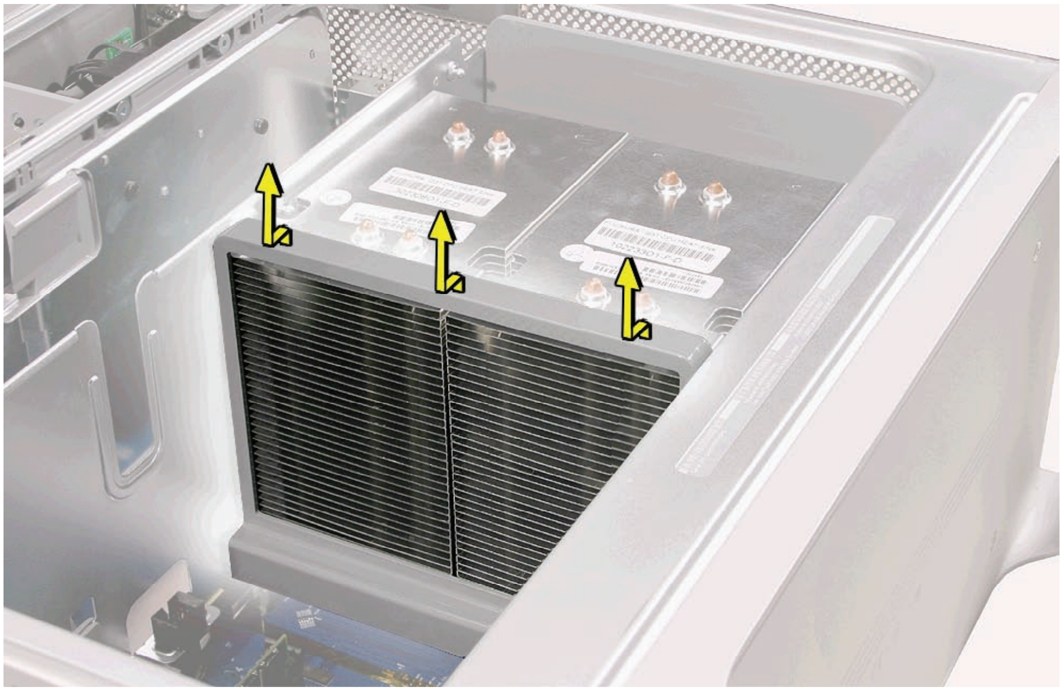
Part Location



Procedure

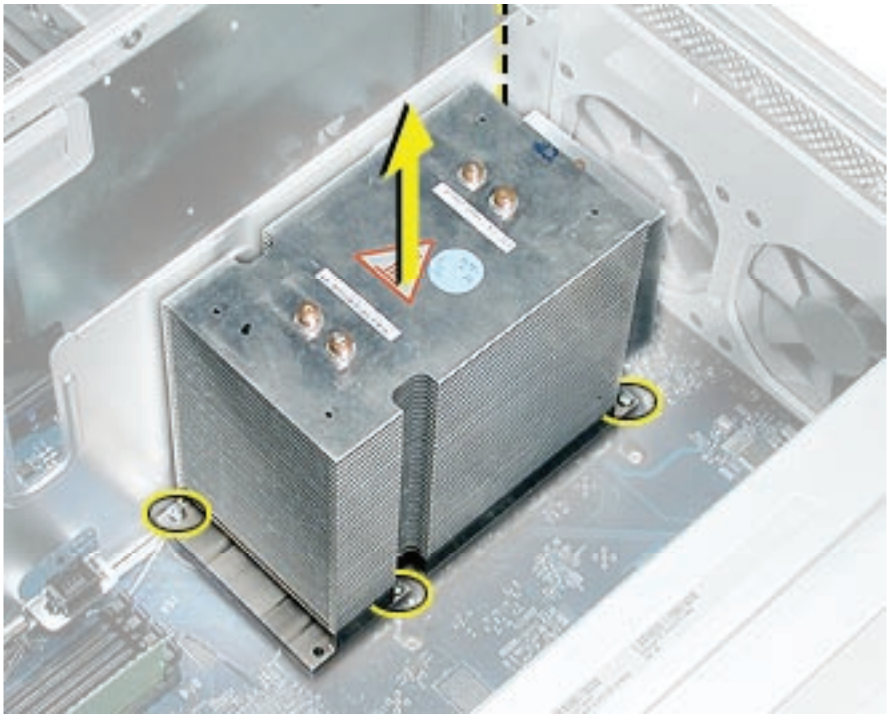
Note: If you have an original Power Mac G5, skip step 1 and go directly to step 2.

1. Tilt the processor inlet frame to the left and then up to unlatch the plastic piece from the heatsink.



Note: The processor in this procedure is secured by four screws requiring either a long-handled Phillips screwdriver or a long-handled 2.5 mm hex wrench, depending on the model. To determine which tool to use, check the head of the screw in the unit you are repairing.

2. If the processor mounting screws have a Phillips head, remove the four screws.



3. If the processor mounting screws have a hex head, loosen the four screws but do not remove them from their standoffs.
4. Lift the heatsink and processor straight up out of the computer.

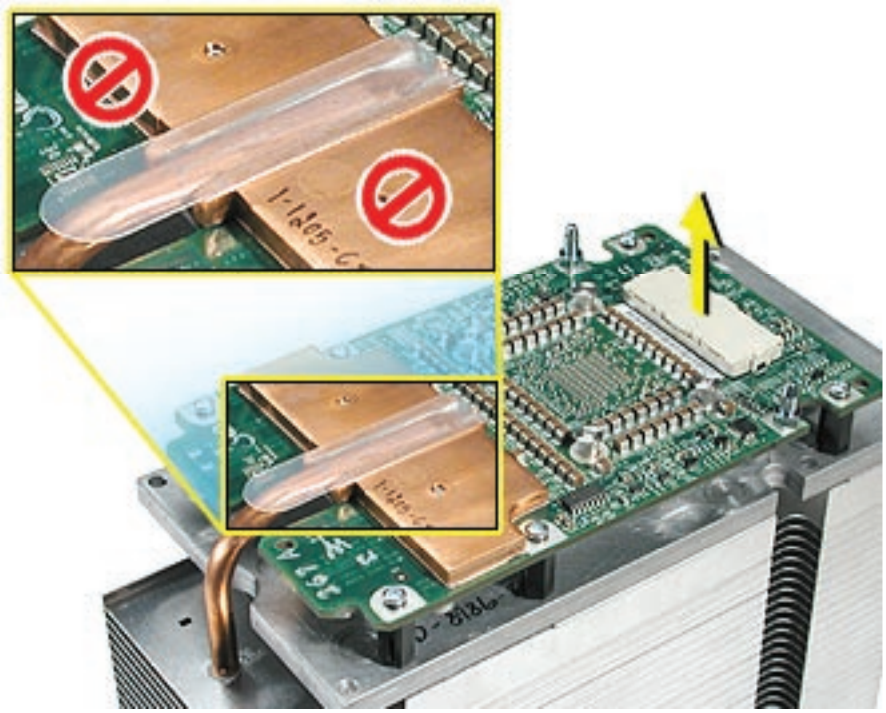
   Warning: The heatsink and processor are a unit. Never separate the heatsink from the processor, or you will damage the processor and void the warranty.

   Note: If you have trouble removing the original processor (processor feels stuck) or installing the replacement processor, check for damaged split standoffs. One or more may be spread too far open, keeping the processor from fully seating in its connector. Replace any damaged split standoffs with the standoffs included with the processor.
5. Repeat steps 1–3 for the second processor, if necessary.

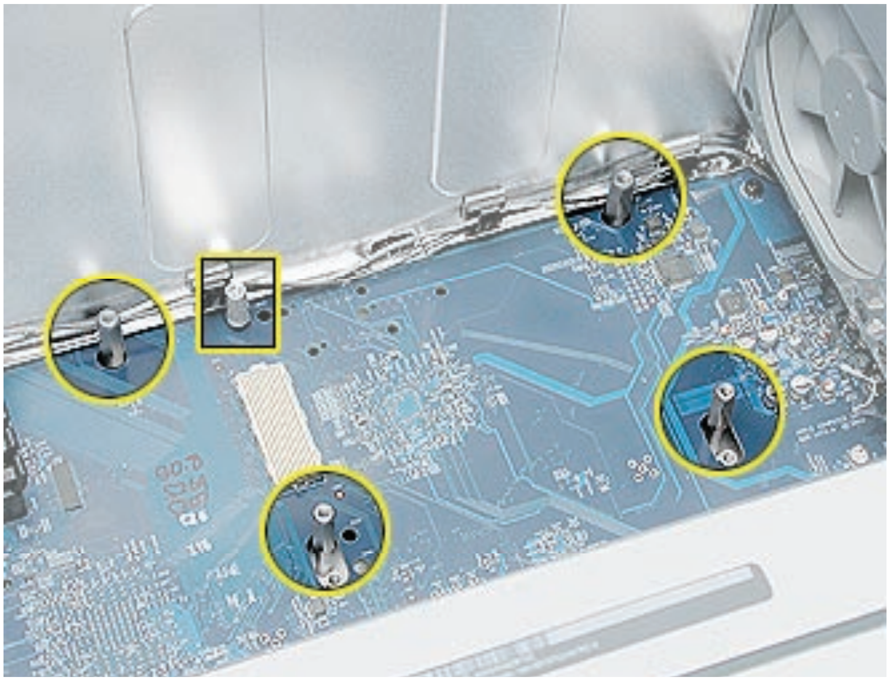
Replacement Procedure

1. If you are replacing the processor with a new processor, do the following:
    - When removing the new processor from its packaging, be careful to lift the processor straight up out of the box. Tilting the processor could damage the heatsink seal.
    - Before installing the processor, remove the cap over the processor connector.

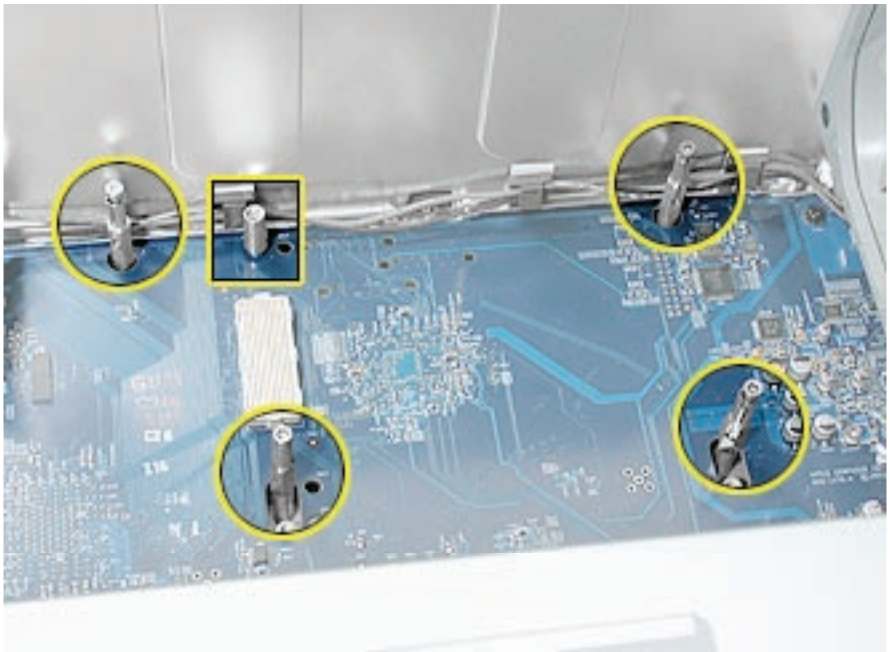
    Warning: Do not remove the clear plastic strip on the bottom of the processor. Removing the plastic could cause a short in the logic board.



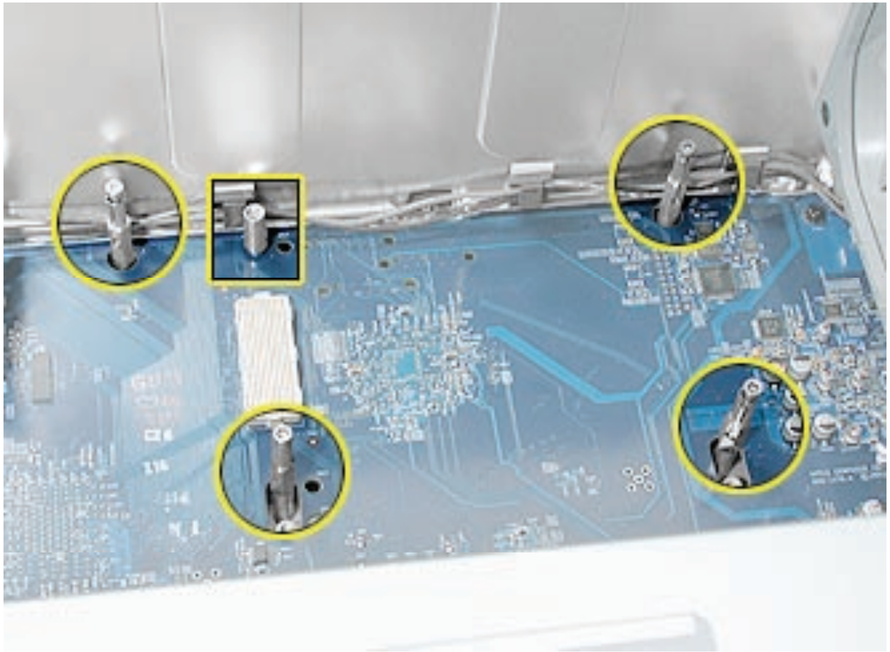
2. Do the following if: a) you are replacing the processor with a new processor and b) the holes for the mounting screws in the original processor are smaller than the holes for the mounting screws in the new processor. Otherwise, go to step 3.
   - Remove the four processor standoffs (marked by circles in the illustration below). Do not remove the processor locator pin (marked by the square).



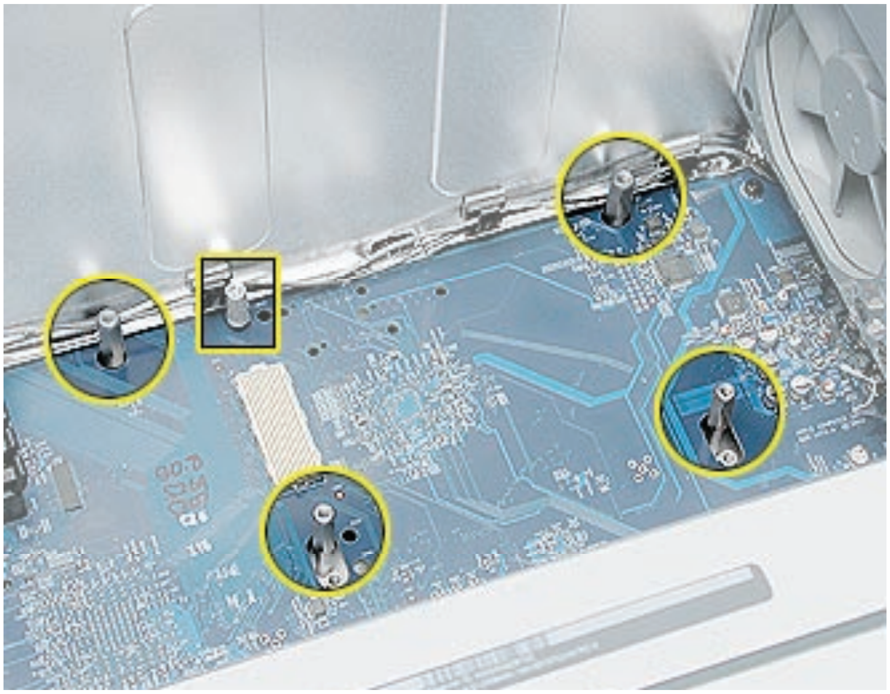
   - Install the four processor standoff assemblies that came with the replacement processor. **Note:** Be sure the standoff assemblies are well secured. Use pliers to tighten them.



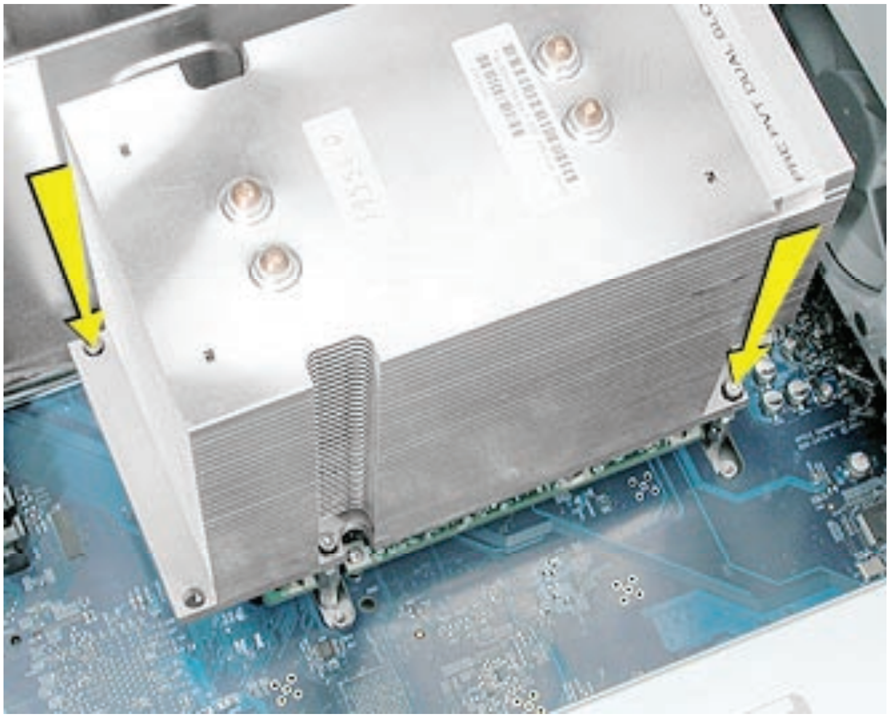
3. Do the following if: a) you are replacing the processor with a new processor and b) the holes for the mounting screws in the original processor are larger than the holes for the mounting screws in the new processor. Otherwise, go to step 4.
   - Remove the four processor standoff assemblies (marked by circles in the illustration below). Do not remove the processor locator pin (marked by the square).



   - Install the four processor standoffs that came with the replacement processor.
     Note: Be sure the standoffs are well secured. Use pliers to tighten them.



4. Lower the processor over the four standoffs.
5. Press down on the base of the heatsink to make sure the processor is connected to the logic board.



6. Firmly tighten the screws in the four standoffs.
   Note: If you installed standoff assemblies in step 2, the screws are part of the assemblies and require a long-handled hex wrench. If you stalled standoffs in step 3, the screws are separate Phillips screws included with the replacement processor and require a long-handled Phillips screwdriver.
7. Repeat steps 1–6 for the second processor, if necessary.
8. Replace the front inlet fan assembly.

Important: Whenever you replace a processor with a new processor, you must run Apple Service Diagnostic (once the computer is reassembled). You must also run the diagnostic if you re-install the same processor but in a different connector from the one in which it was originally installed. Apple Service Diagnostic for Power Mac G5 is available as a download from the Disc Images section of the Apple Service Source website. For more information, see "Thermal Calibration" in the Troubleshooting chapter.

Processor: Power Mac G5 (June 2004 Dual 2.5GHz), Power Mac G5 (Early 2005 Dual 2.7GHz)

Note: The illustrations in this procedure show the Delphi version of the processor. Except where noted, the procedure for the Panasonic version is the same.

Tools

This procedure requires a long-handled 2.5 mm hex wrench.

Preliminary Steps

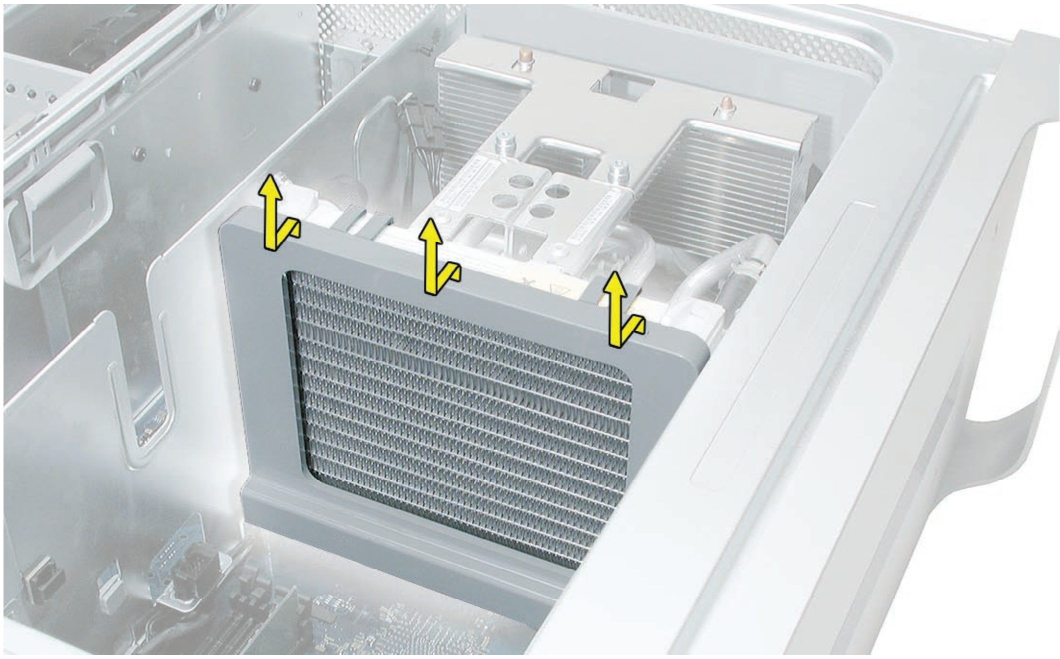
Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

- **Front inlet fan assembly**
- **Heatsink cover for Power Mac G5 (June 2004/Early 2005)**

Part Location

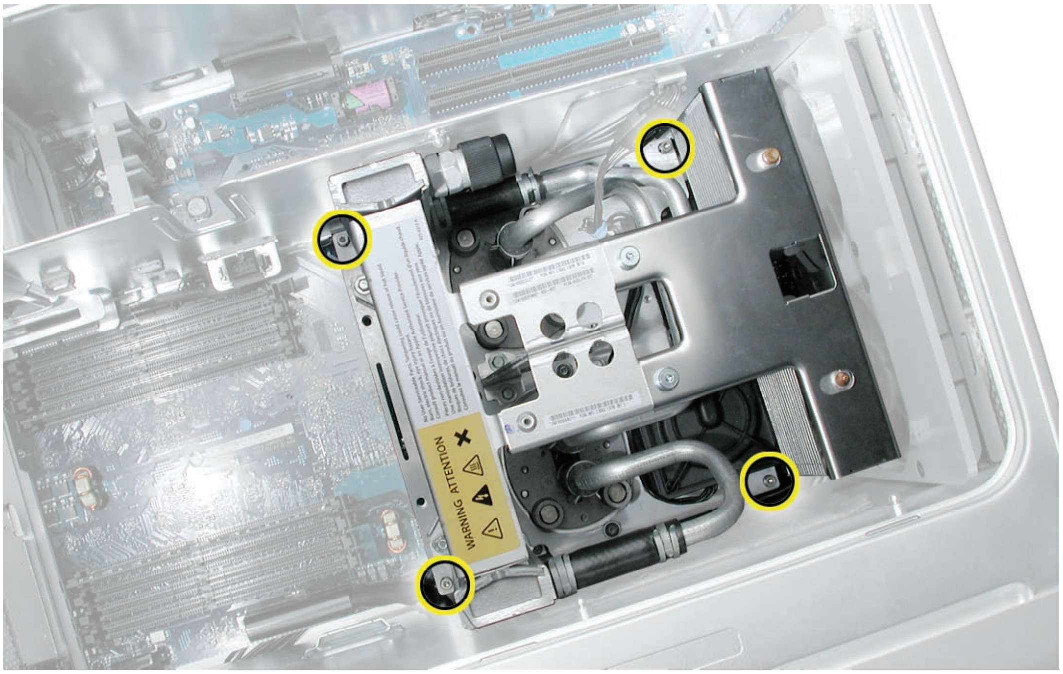
Procedure

1. Tilt the processor inlet frame to the left and then up to unlatch the plastic piece from the heatsink.

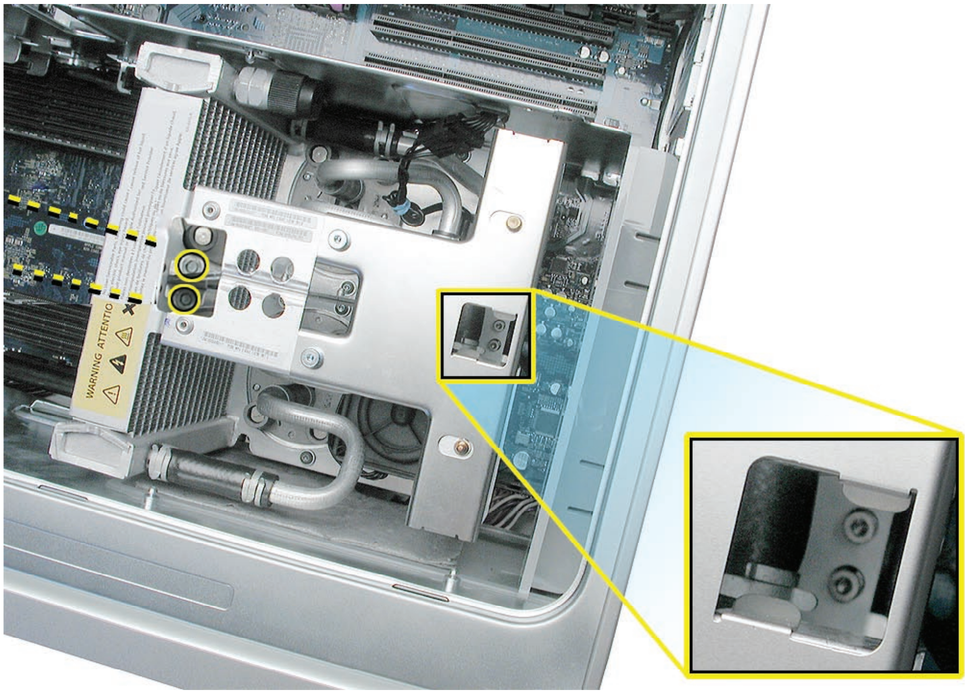


Note: The processor in this procedure is secured by eight screws requiring a long-handled 2.5 mm hex wrench.

2. Loosen the four hex screws marked below, but do not remove them from their standoffs.

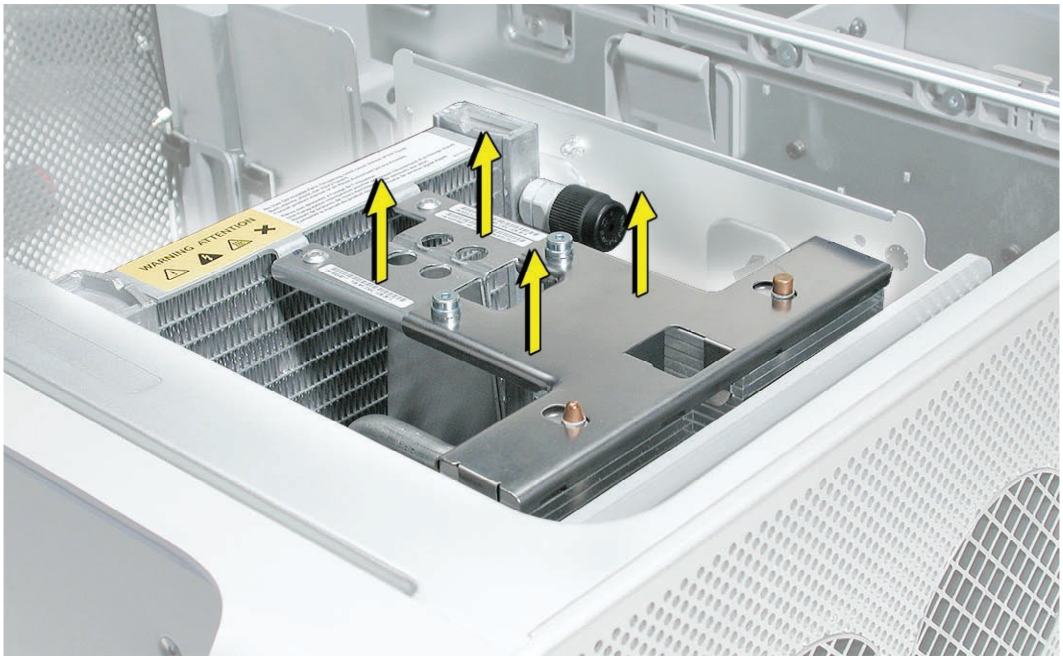


3. Loosen the four remaining hex screws but do not remove them from their standoffs.



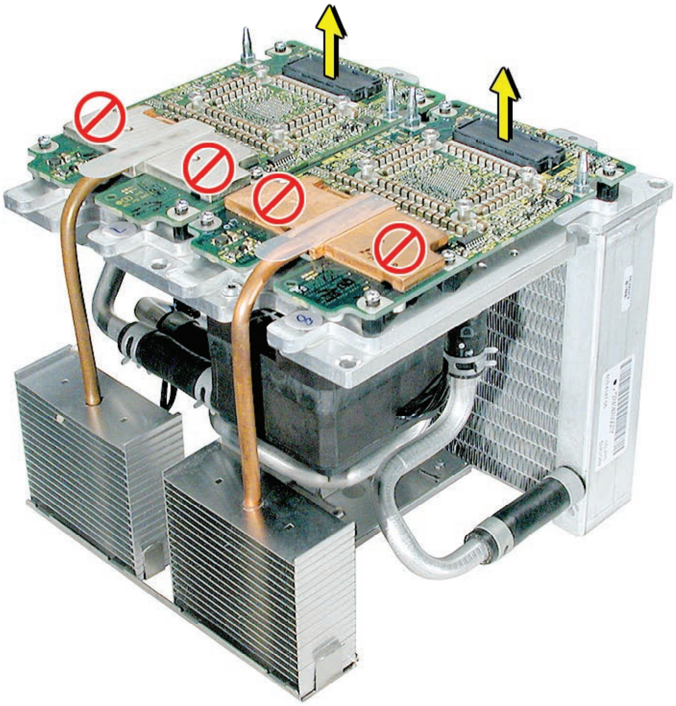
4. Hold the heatsink by the middle and lift the heatsink straight up out of the computer.

Warning: The heatsink and processor are one unit. Do not attempt to open or service the liquid cooling system. Opening the liquid cooling system may damage your equipment and such damage may not be covered by the limited warranty on your computer.



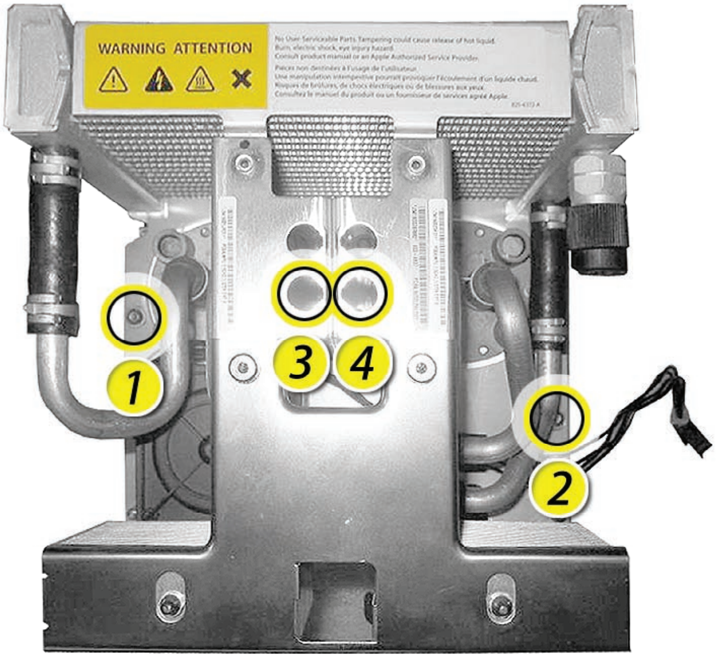
Replacement Procedure

1. 1. If you are replacing the processor with a new processor, do the following:
   - When removing the new processor from its packaging, be careful to lift the processor straight up out of the box. Tilting the processor could damage the heatsink seal.
   - Before installing the processor, remove the caps over the processor connectors.

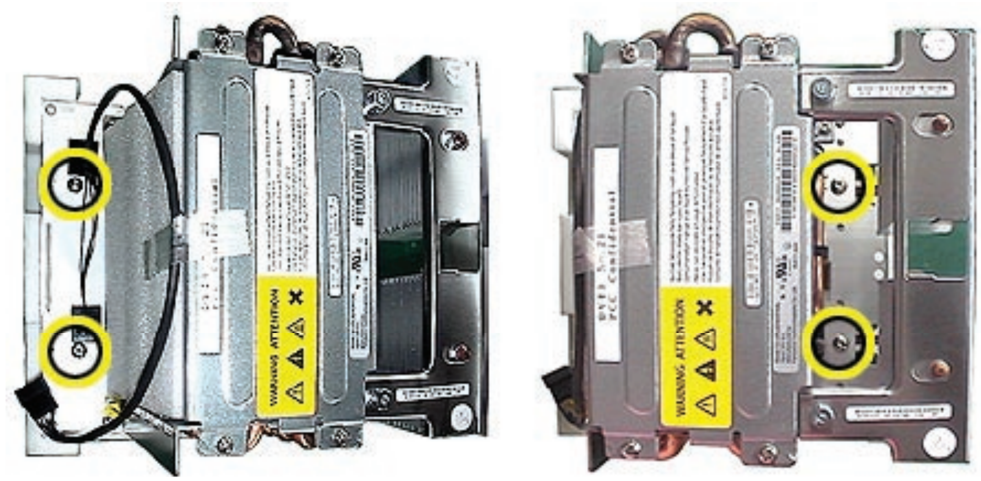


2. Loosen the screws marked below.

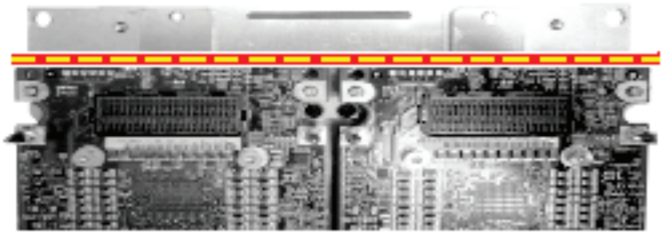
   Delphi version


WARNING ATTENTION
1
2
3
4

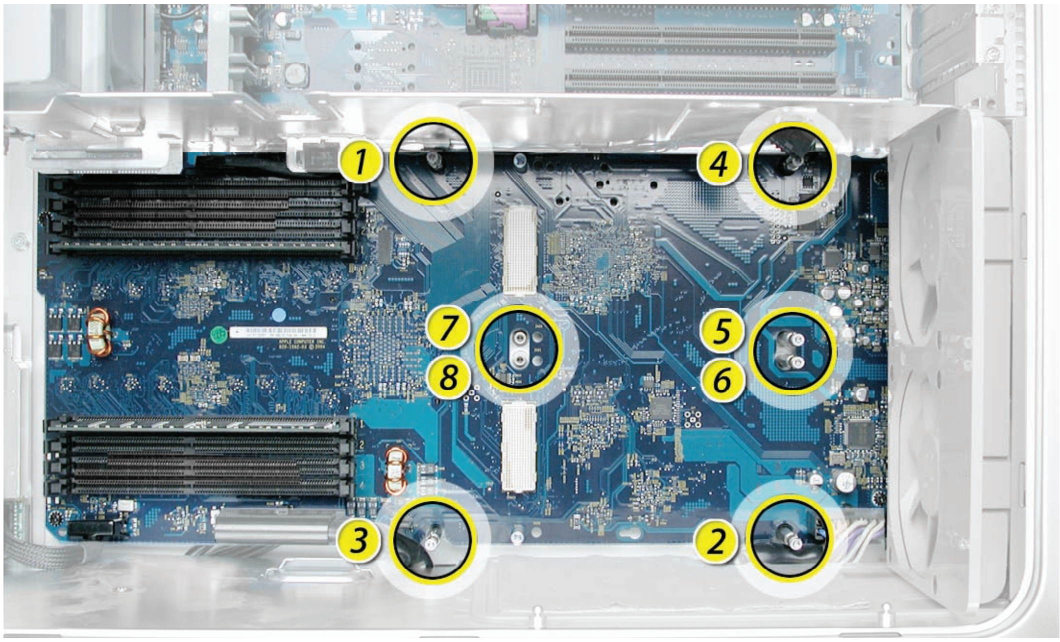
   Panasonic version


WARNING ATTENTION
WARNING ATTENTION

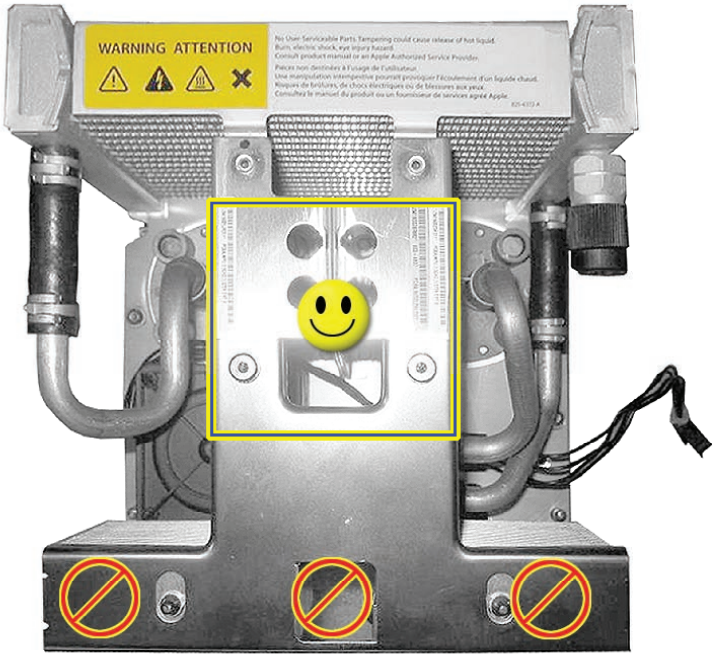
3. Check to make sure the top edges of both processors align.



4. Replace the eight standoffs with the new standoffs bundled with the processor.
5. Lower the processor over the eight standoffs and two processor connectors.



6. Press down on the middle (bridge) of the heatsink to make sure the processor is connected to the logic board. Gently rock the heatsink until it feels seated.
   Warning: Don't press on the end of the heatsink or you'll damage the processor.



7. Tighten the screws in the eight standoffs in the order indicated above.

8. Tighten the remaining screws from step 2.
9. Replace the processor inlet frame on the front of the heatsink.

Important: Whenever you replace a processor with a new processor, you must run Apple Service Diagnostic (once the computer is reassembled). Apple Service Diagnostic for Power Mac G5 is available as a download from the Disc Images section of the Apple Service Source website. For more information, see "Thermal Calibration" in the Troubleshooting chapter.

Heatsink Cable: Power Mac G5 (June 2004 Dual 2.5 GHz and Early 2005 2.7 GHz)

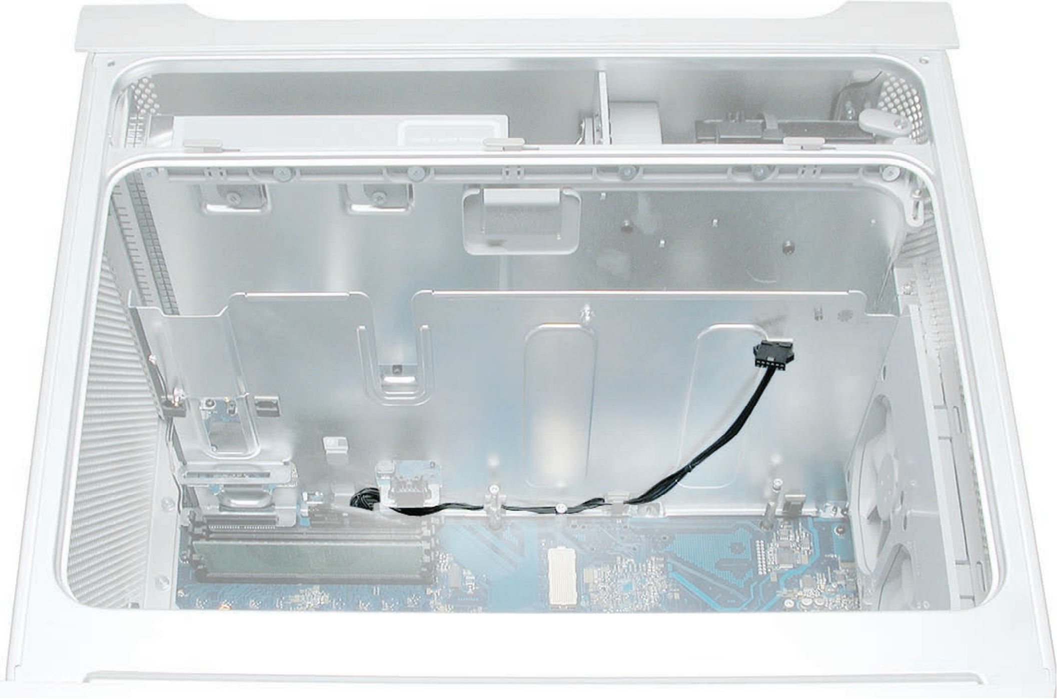
Tools

No tools are required for this procedure.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up and remove the processor.

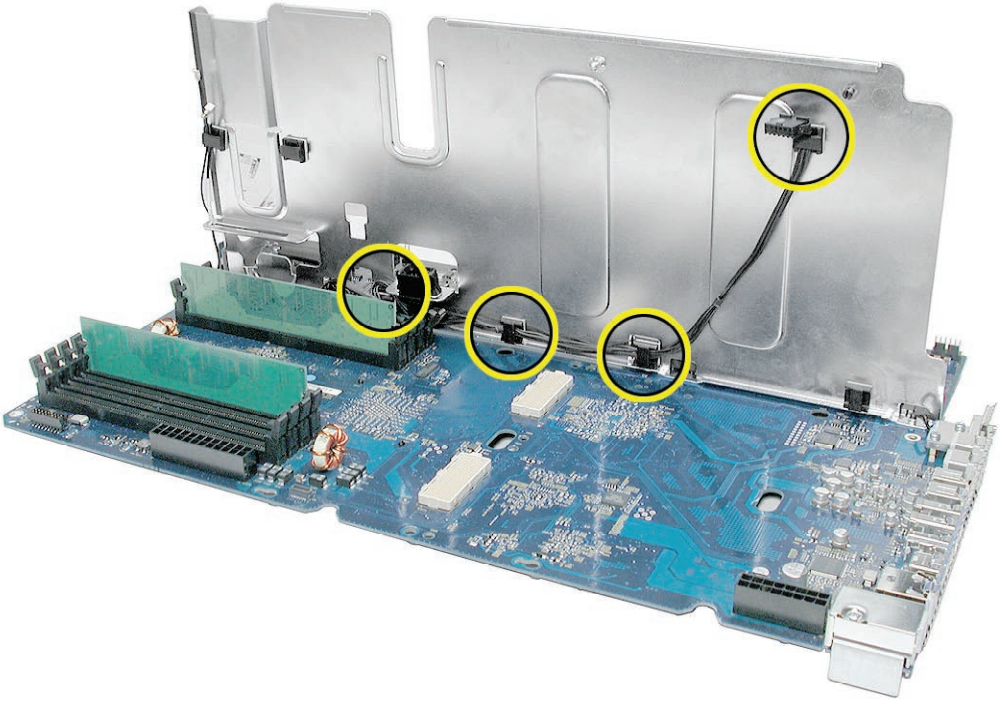
Part Location



Procedure

1. Release the cable from the PCI divider cable guides.
2. Disconnect the cable from the logic board.

   Note: This illustration shows the logic board removed from the enclosure. You do not have to remove the logic board to change the cable.



Rear Exhaust Fans

Tools

The following tools required for this procedure:

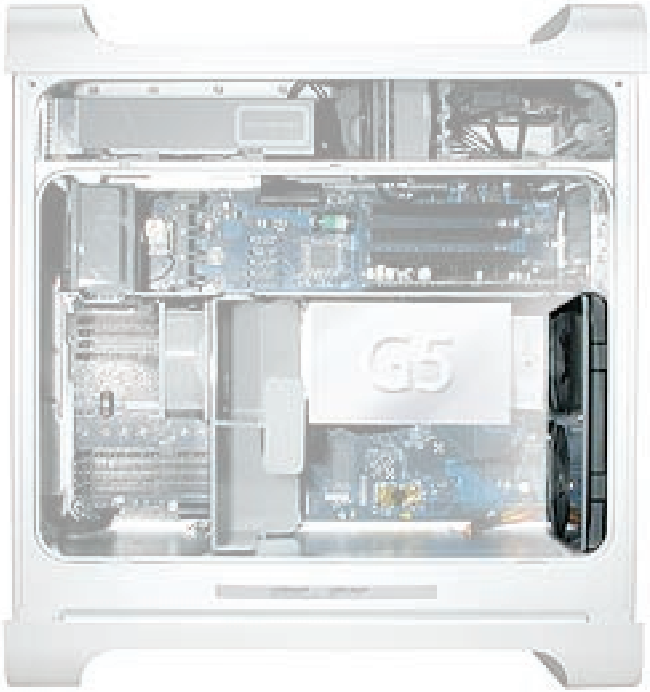
- Phillips screwdriver
- Needlenose pliers
- Flatblade screwdriver

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

- All AGP and PCI cards
- Heatsink cover (Power Mac G5 (June 2004/Early 2005) computers only)

Part Location

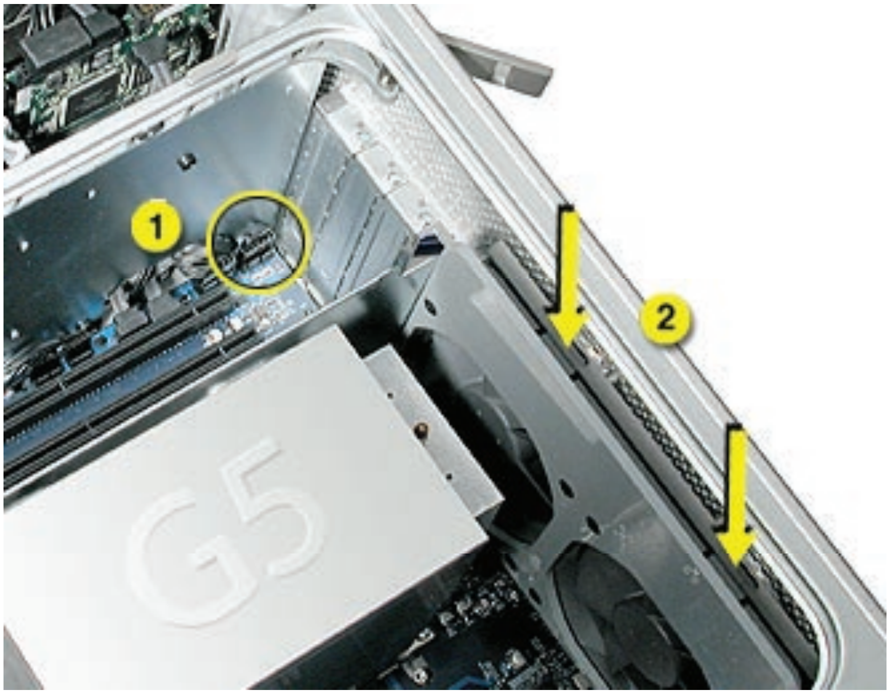


Procedure

1. Disconnect the fan cable from the logic board.

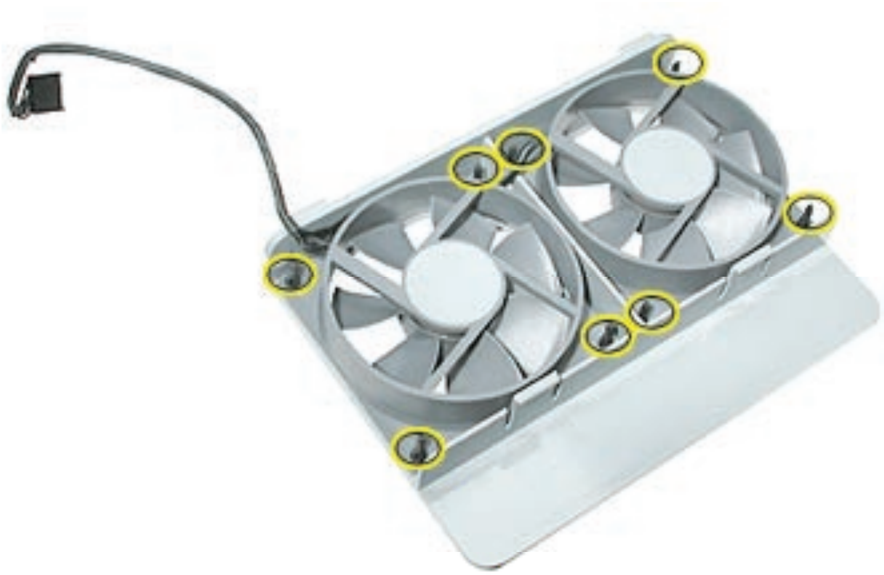
   Note: Press the cable connector up toward the media shelf when disconnecting the cable.

2. Press down on the two tabs on the top of the fan bracket to release the two latches.

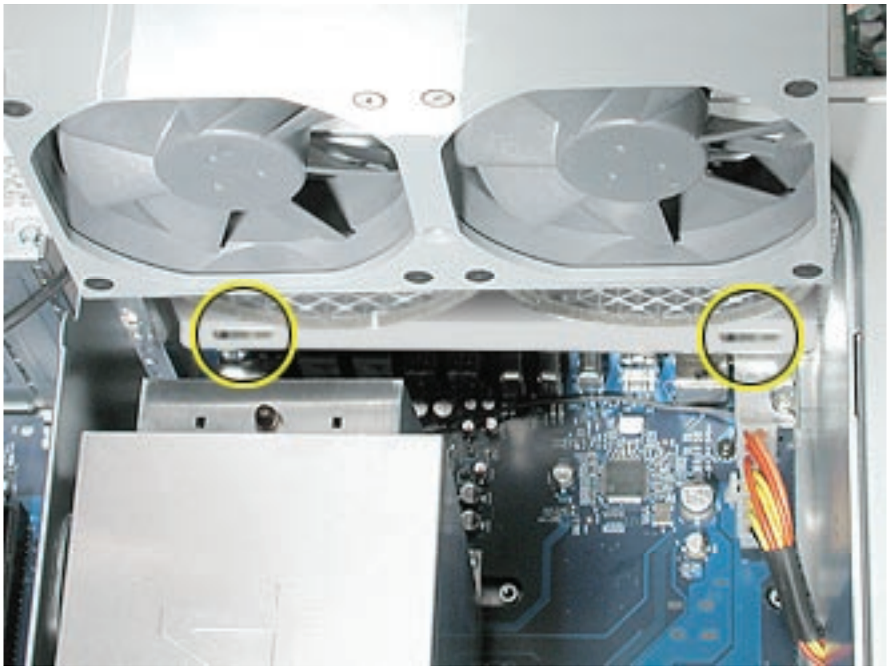


3. Lift the fan bracket and fans out of the enclosure.

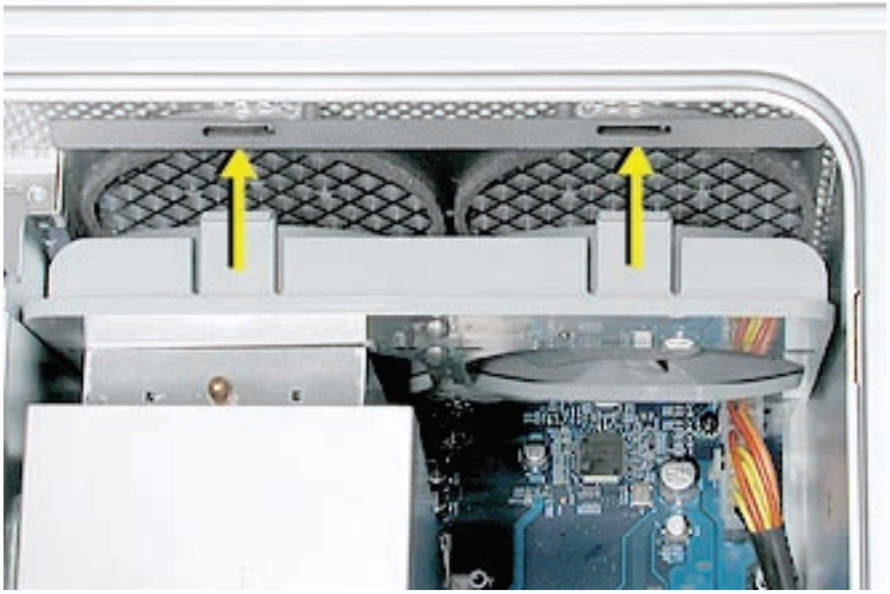
4. If you are replacing the fans, use needlenose pliers to pull each fan off the four grommets that mount it to the bracket, and remove the fans and cable from the bracket.



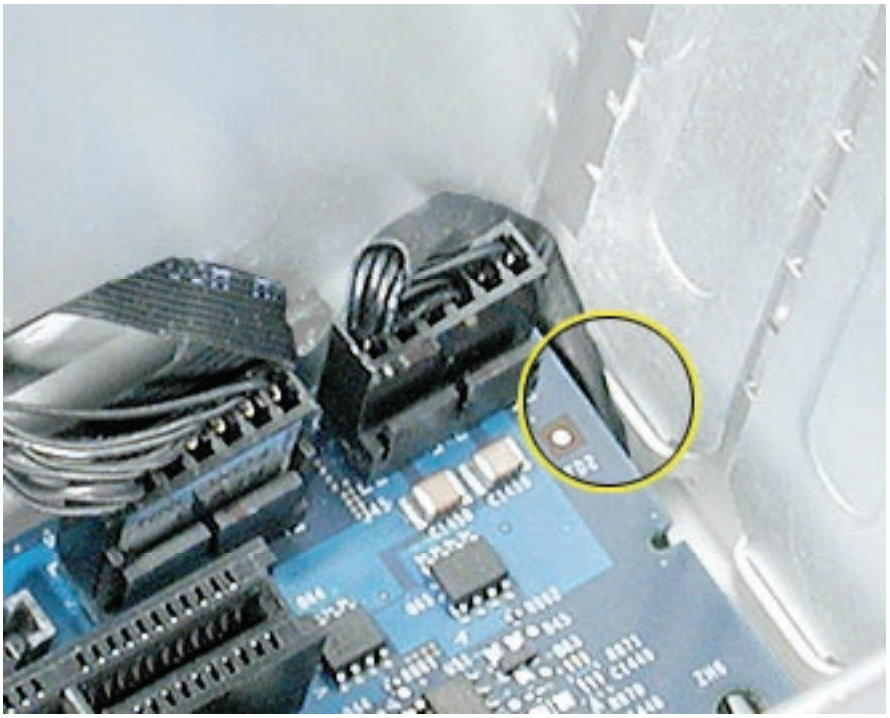
Replacement Note: When reinstalling the fan bracket in the enclosure, make sure the two tabs on the bottom of the bracket engage with the slots in the enclosure's fan guide.



Then rotate the fan back flush with the rear panel, making sure the two latches on the top of the bracket engage with the two slots on the top of the fan guide.



Replacement Note: Using a flatblade screwdriver, tuck the fan cable under the edge of the logic board.



Modem Filter Board and Cables: Power Mac G5

Tools

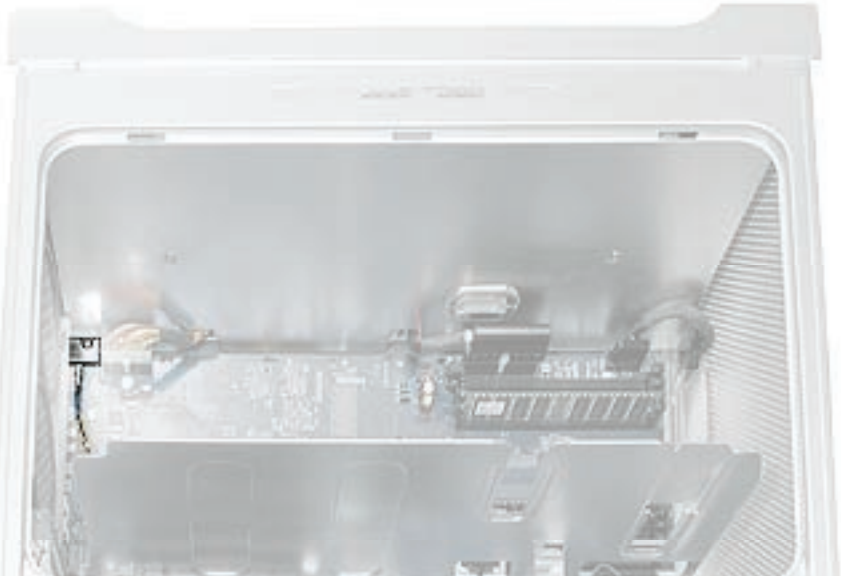
The only tools required for this procedure are a long-handled and a short-handled Phillips screwdriver.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

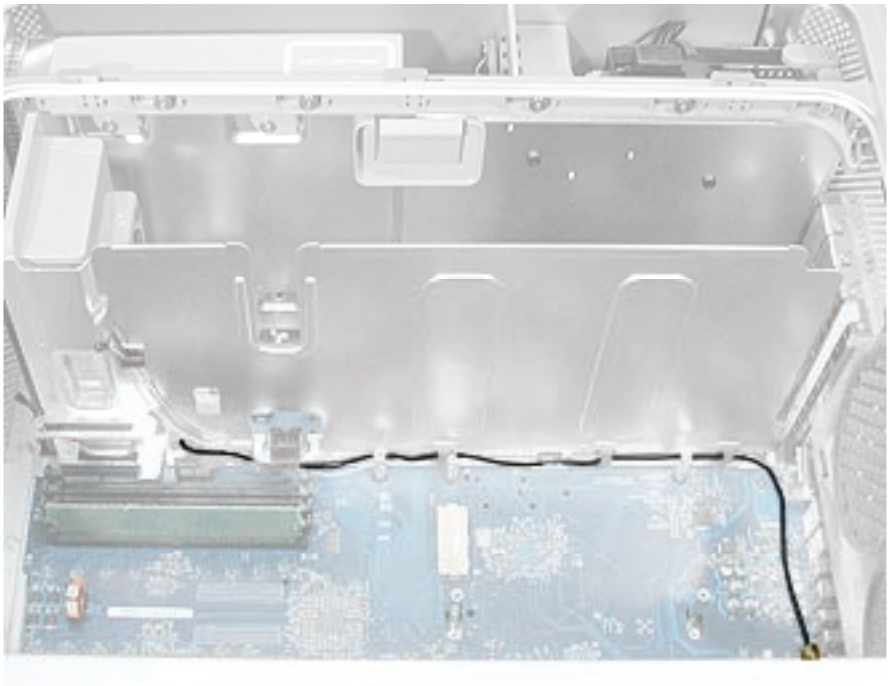
- Front inlet fan assembly
- Heatsink cover(s)
- Processor(s)
- All AGP and PCI cards
- Rear exhaust fan assembly
- Speaker/fan assembly
- Modem

Part Location

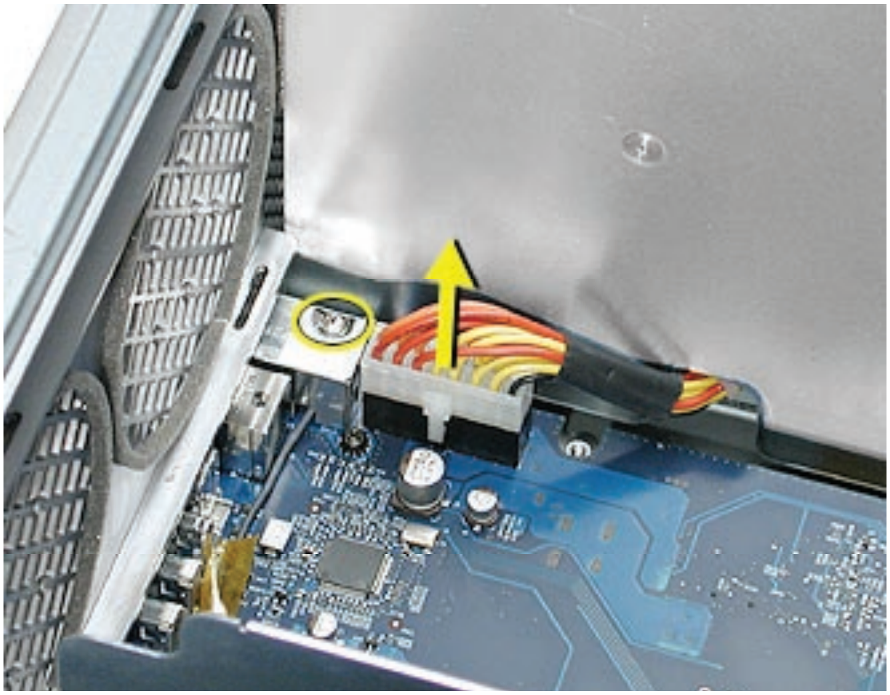


Procedure

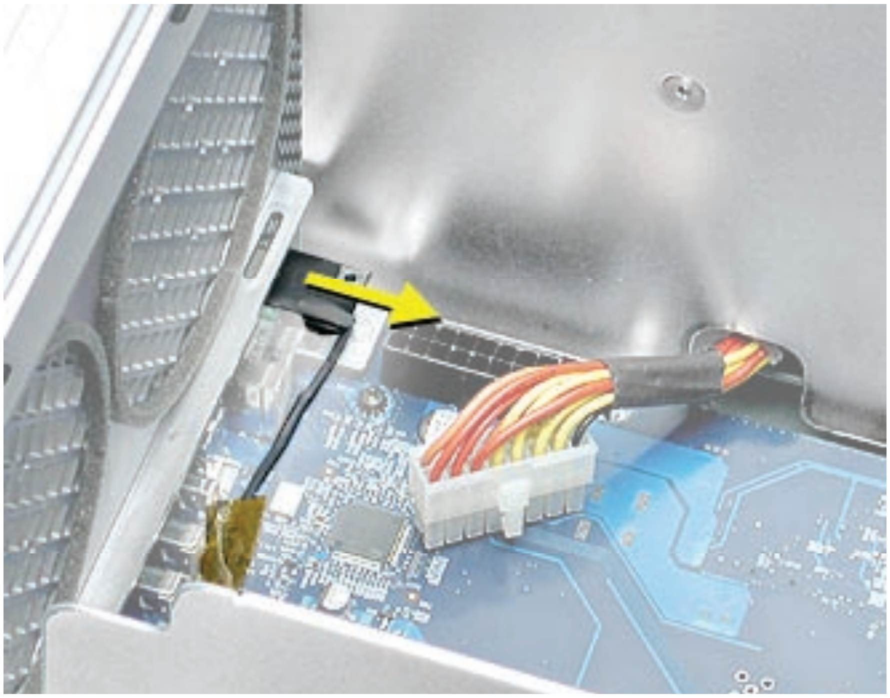
1. Route the modem filter board cable out through the opening in the PCI divider.
2. Disengage the cable from the cable guides on the PCI divider.



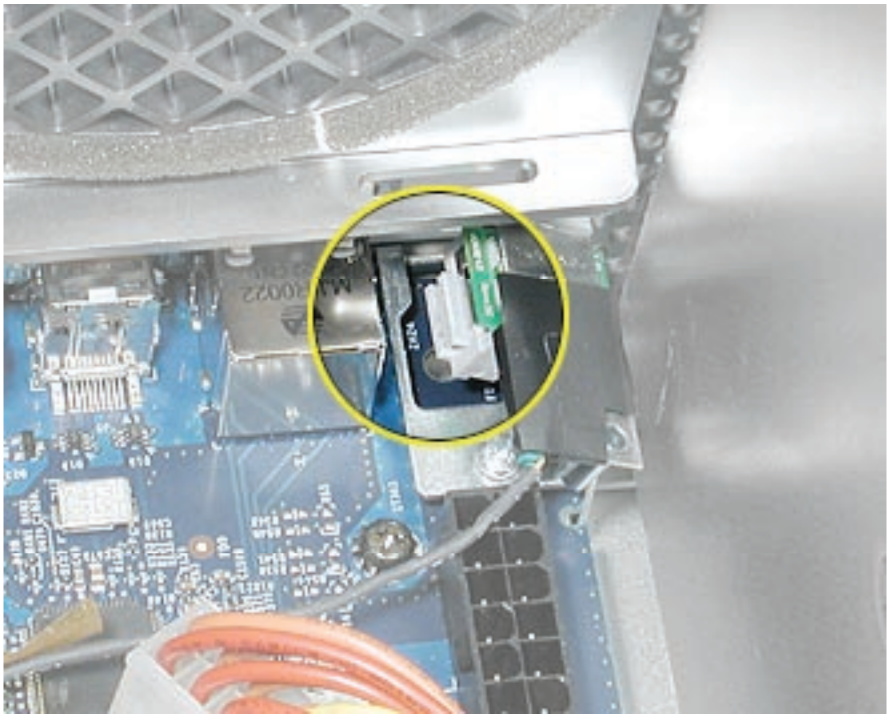
3. Disconnect the power cable next to the modem filter board.
4. Remove the mounting screw on the modem filter board cap.



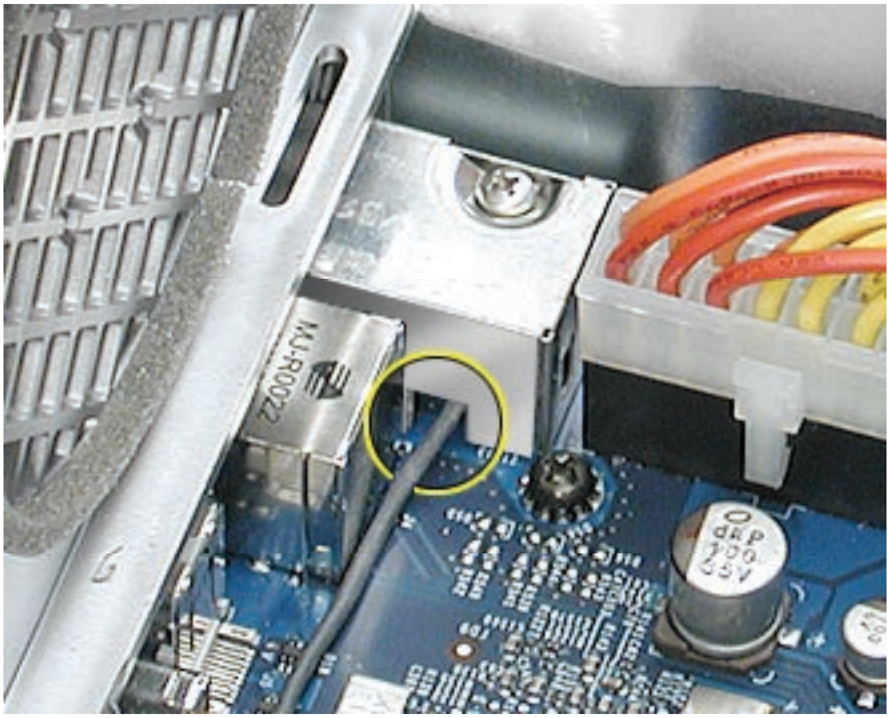
5. Slide the modem filter board back to disengage it from its mounting bracket, and remove the board and cable from the logic board.



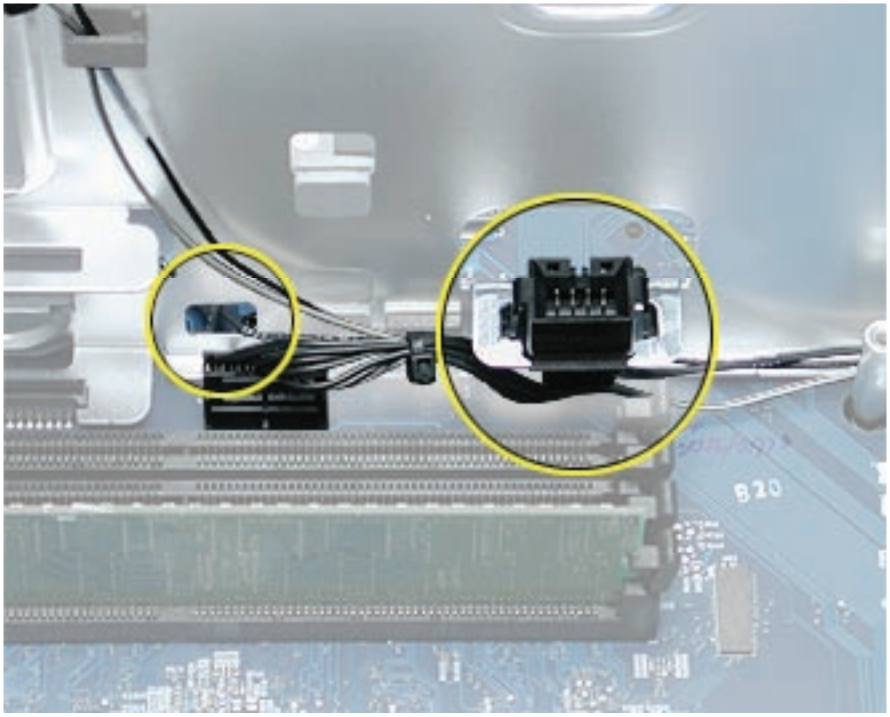
Replacement Note: When re-installing the modem filter board in its mounting bracket, be careful to engage the slots in the board with the edges of the bracket.



Replacement Note: Make sure the modem filter cable routes out through the opening in the side of the modem filter cap before securing the cap to the modem filter board.



Replacement Note: Be careful when rerouting the modem filter cable that it routes under the black connector for the front inlet fan and out through the correct opening in the PCI divider. Make sure the cable is in place behind all cable guides.



Antenna Board and Cables: Power Mac G5

Tools

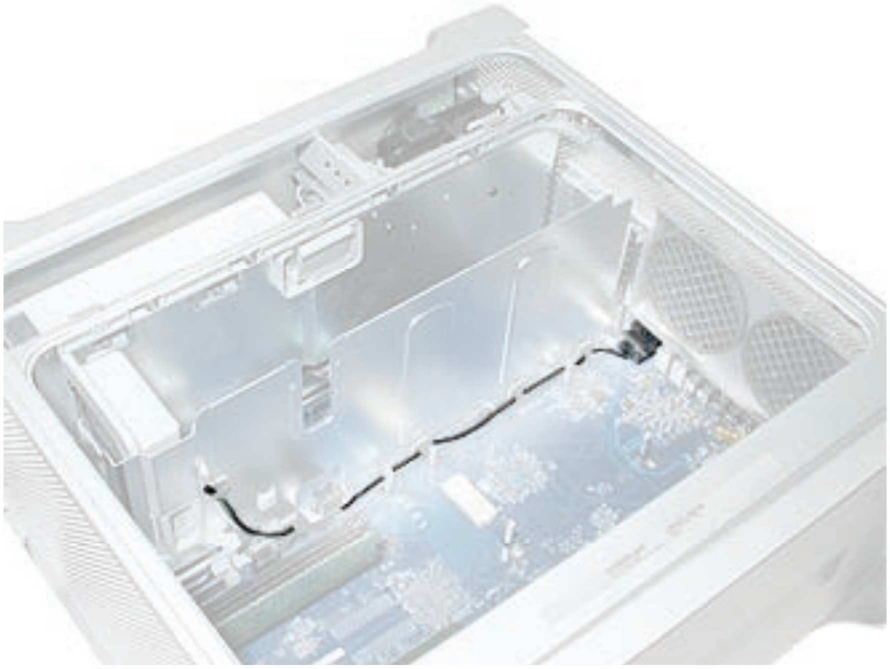
The only tools required for this procedure are a long-handled and a short-handled Phillips screwdriver.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

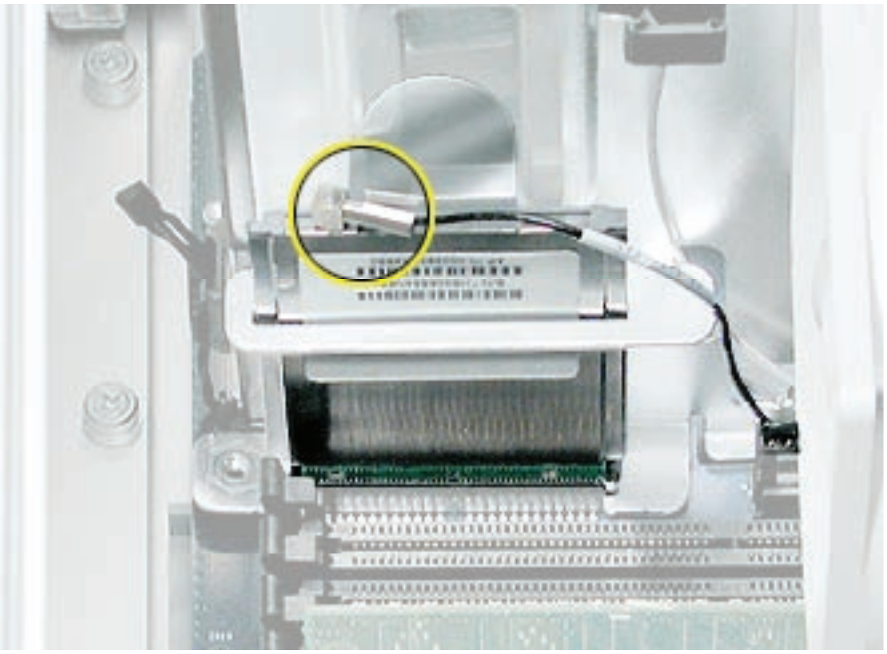
- Front inlet fan assembly
- Upper processor heatsink cover
- Upper processor
- All AGP and PCI cards
- Rear exhaust fan assembly

Part Location

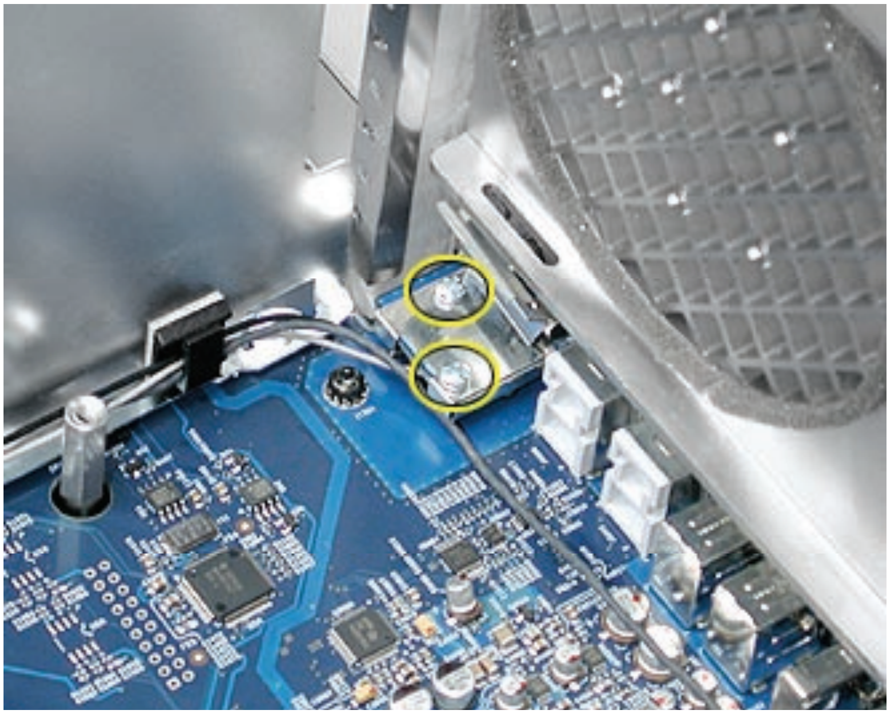


Procedure

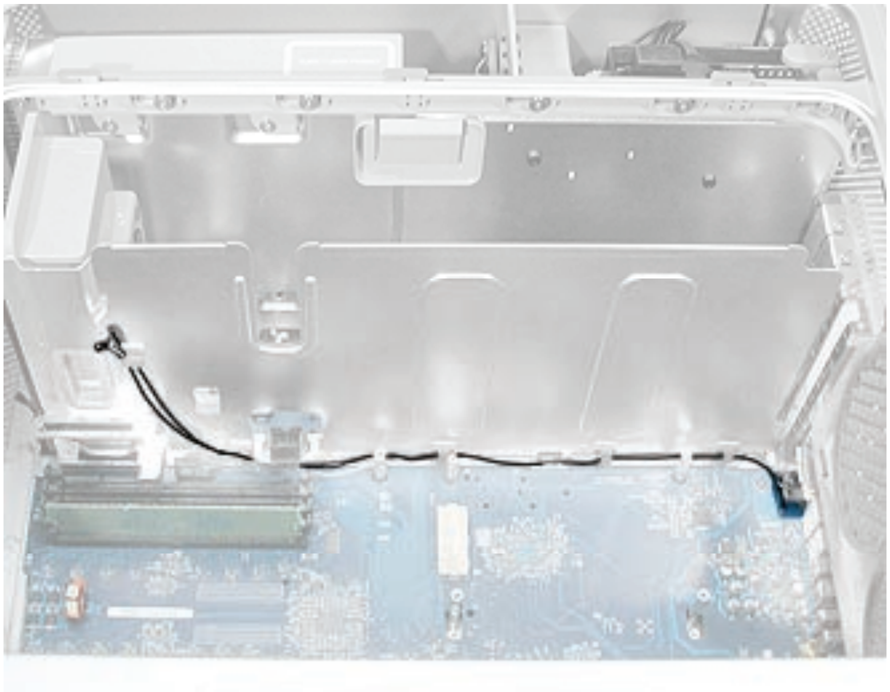
1. Disconnect the black antenna cable from the AirPort Extreme Card (if installed).



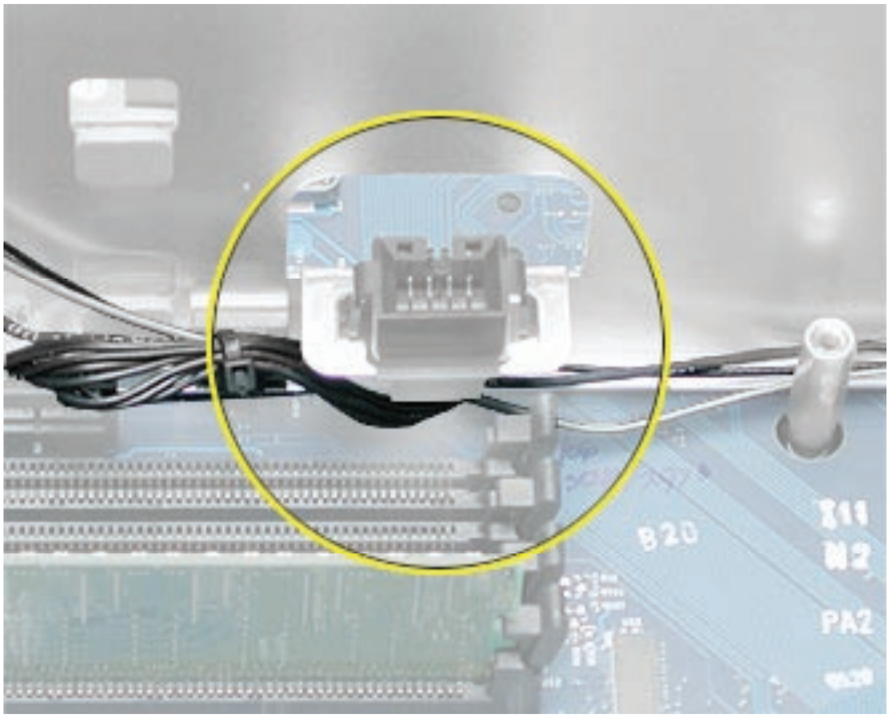
2. Disconnect the gray antenna cable from the Bluetooth card (if installed).
3. Bend the antenna board shield back far enough so that you can access the two antenna board mounting screws, and remove the screws.



4. Remove the Bluetooth cable (gray) and AirPort cable (black) from the cable guides and remove the antenna board and cables from the logic board.



Replacement Note: Be careful when rerouting the two antenna cables that they route under the black connector for the front inlet fan. Make sure that the cables are in place behind all cable guides.



Front Panel Board Cable

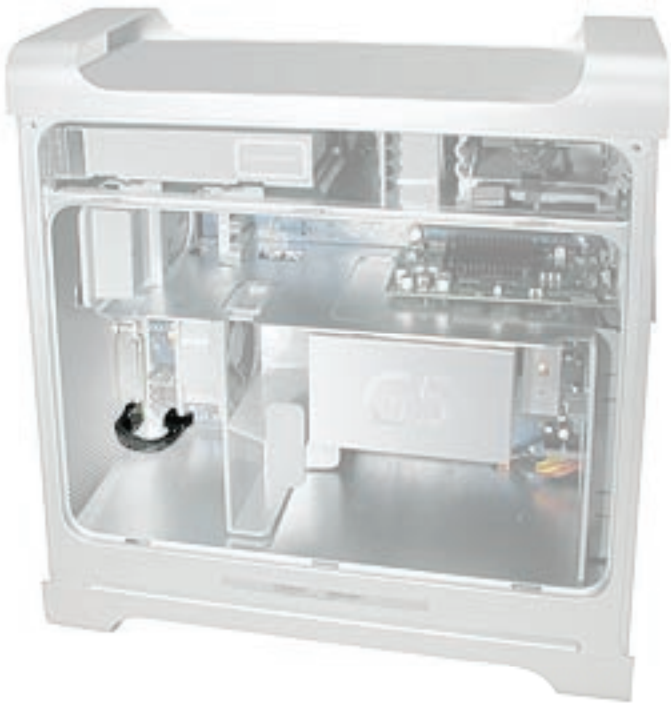
Tools

No tools are required for this procedure.

Preliminary Steps

Before you begin, open the computer and lay it on its side with the access side facing up.

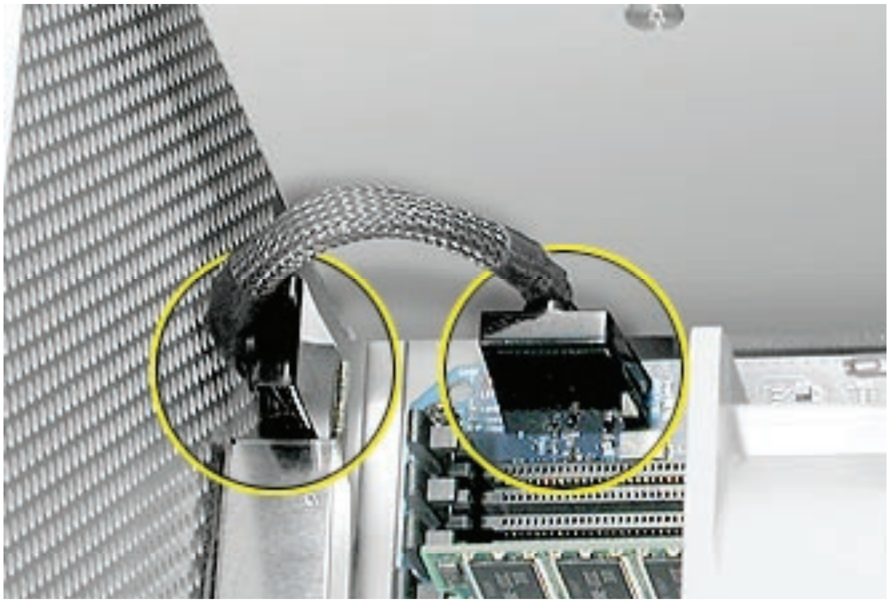
Part Location



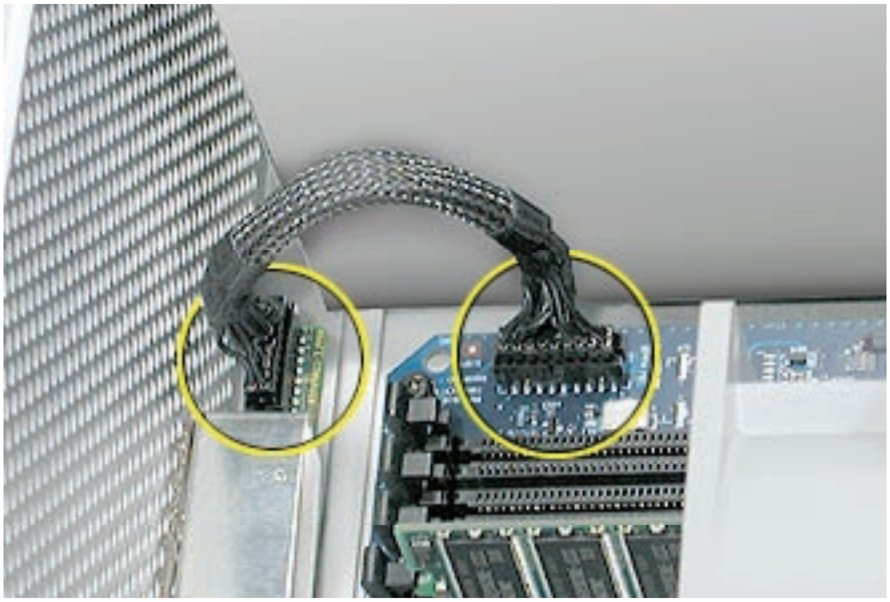
Procedure

Warning: The black plastic caps on the front panel board cable fit tightly over the cable connectors. Be very careful when removing the caps and disconnecting the cable so that you do not damage the logic board or front panel board.

1. Remove the two caps that cover the front panel board cable connectors.
   Note: To remove each cap, spread apart the two sides of the cap, and then carefully rock the cap forward and backward until you feel it release.



2. Disconnect the cable from the logic board.
3. Disconnect the other end of the cable from the front panel board and remove the cable from the enclosure.



Power Supply: Power Mac G5, Power Mac G5 (June 2004 Dual 1.8/2.0 GHz), Power Mac G5 (Early 2005 Dual 2.0/2.3 GHz)

Tools

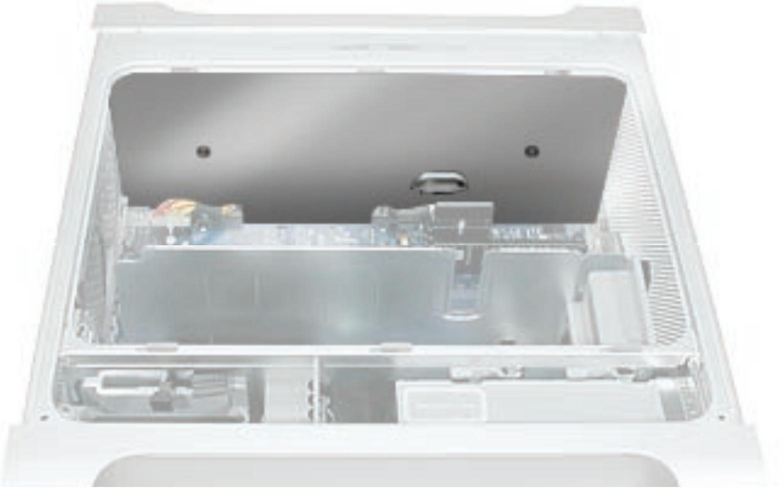
The only tools required for this procedure are a long-handled and a short-handled Phillips screwdriver.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

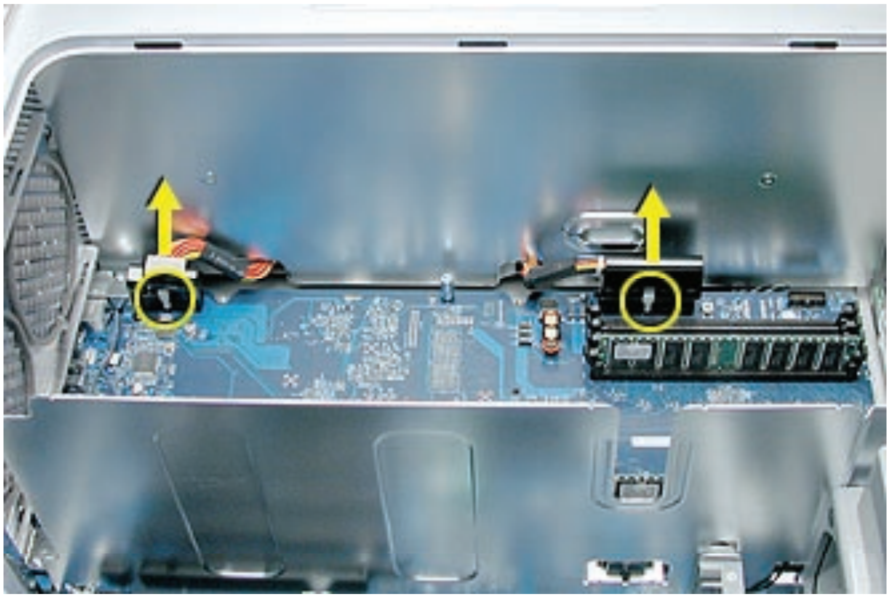
- Front inlet fan assembly
- Heatsink cover(s) for Power Mac G5 or
- Heatsink cover(s) for Power Mac G5 (June 2004/Early 2005)
- Processor(s)
- All AGP and PCI cards
- Rear exhaust fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable

Part Location

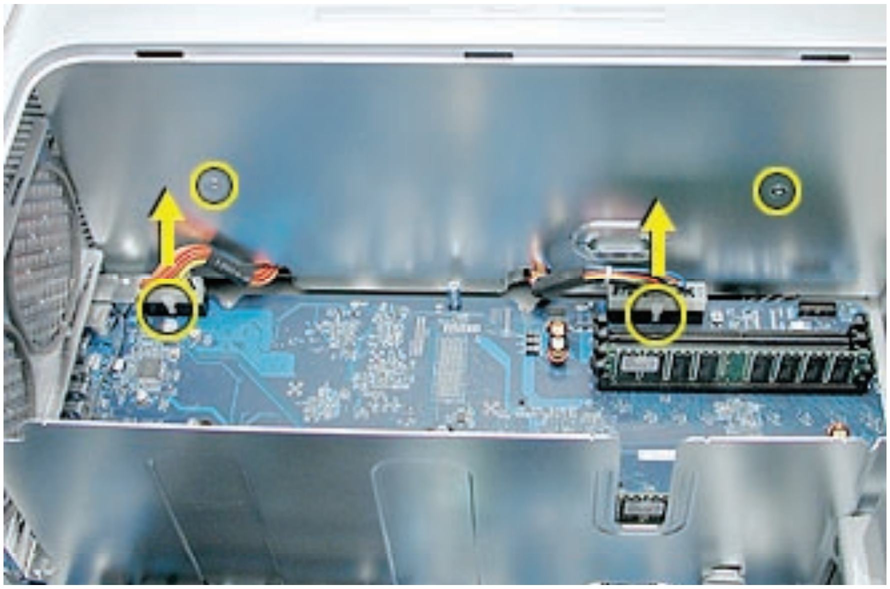


Procedure

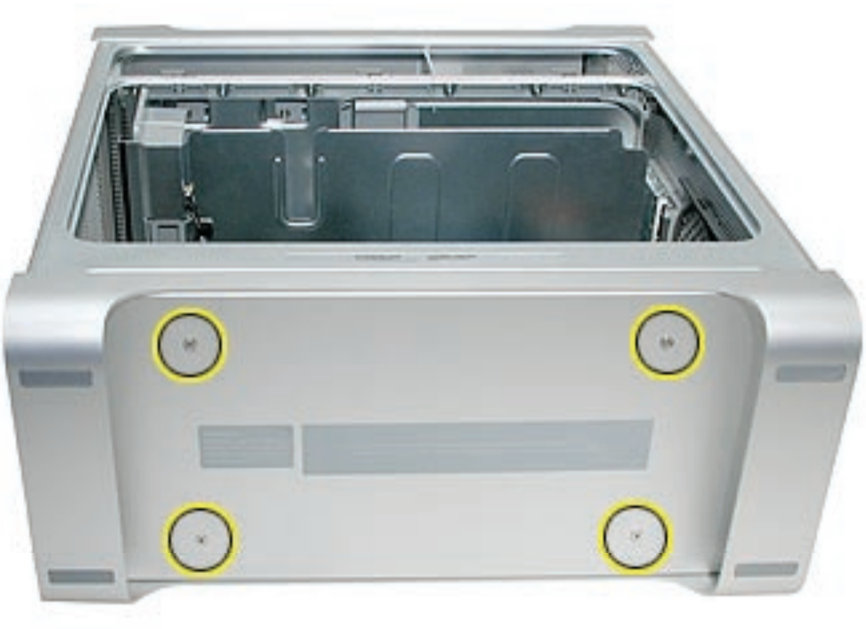
1. Remove the black plastic caps covering the two power supply cable connectors.
   Note: The caps fit tightly over the connectors. To remove them, rock the caps gently forward and backward as you lift up.



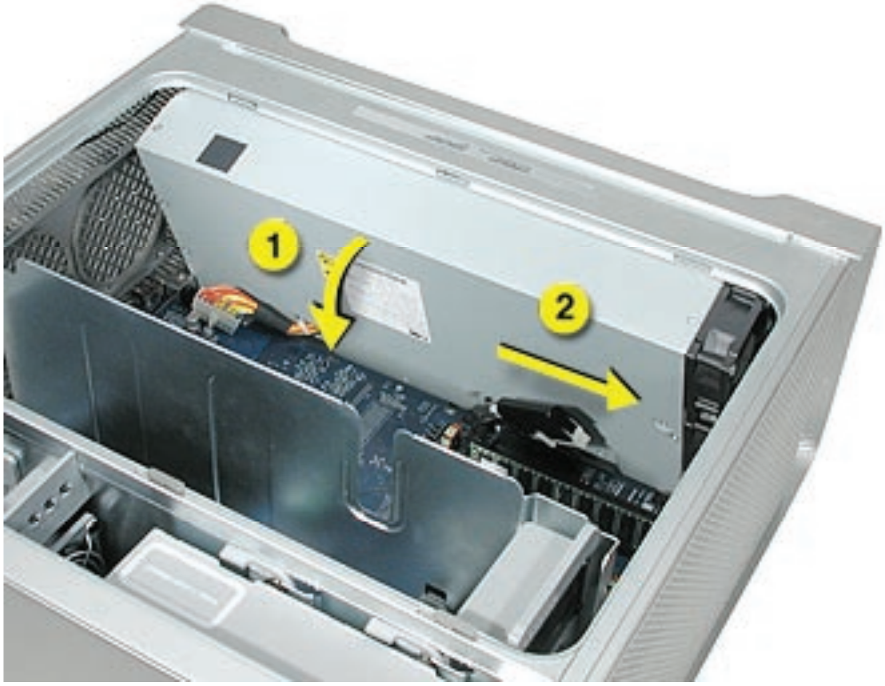
2. Press in on the release latch on the first power supply cable connector and disconnect the cable from the logic board. Repeat for the other power supply cable.
3. Remove the two screws that secure the power supply top cover, and remove the cover from the enclosure.
   Warning: Whenever the power supply cover is removed, be very careful not to drop any screws into the power supply. Doing so could short out the unit.



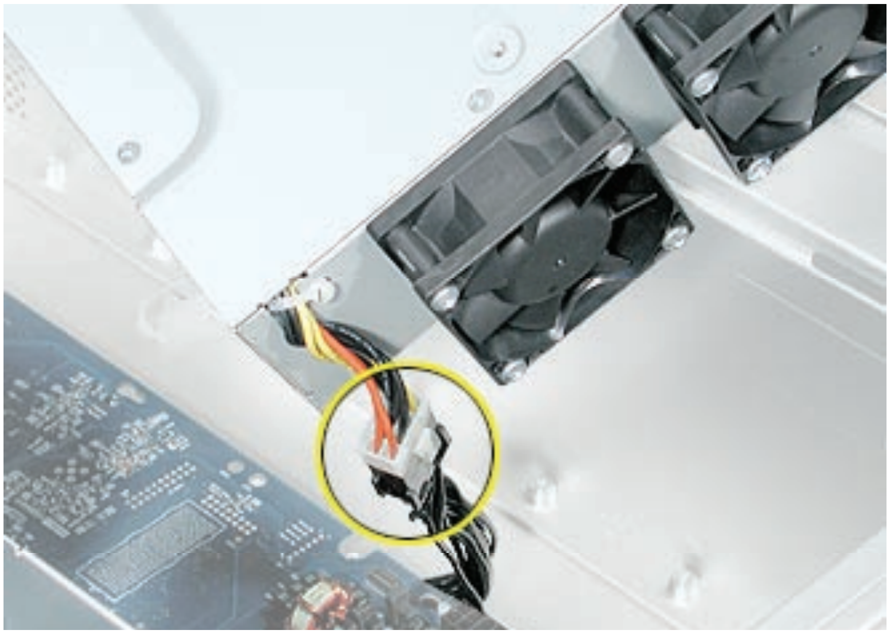
4. Remove the four power supply mounting screws on the bottom of the enclosure.



5. Push in on the power receptacle, and slide the power supply toward the front of the computer.
6. Tilt the power supply a short distance out of the bottom of the enclosure.

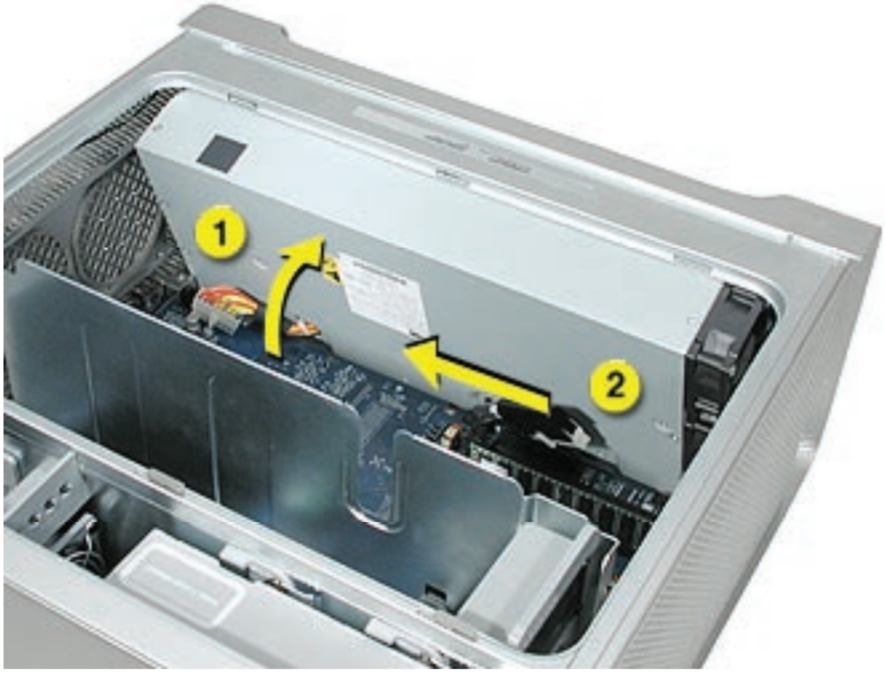


7. Disconnect the power harness cable from the power supply.



8. Remove the power supply from the enclosure.

Replacement Note: After reconnecting the power supply to the power harness cable, slightly lift the cable so that it does not become wedged under the power supply, and lower the power supply into the enclosure. Rotate the power supply back flush with the enclosure bottom until it snaps into place. Then slide the power supply toward the back of the computer, making sure the power receptacle aligns with the opening in the back panel.



Power Supply: Power Mac G5 (June 2004 Dual 2.5 GHz and Early 2005 Dual 2.7 GHz)

Tools

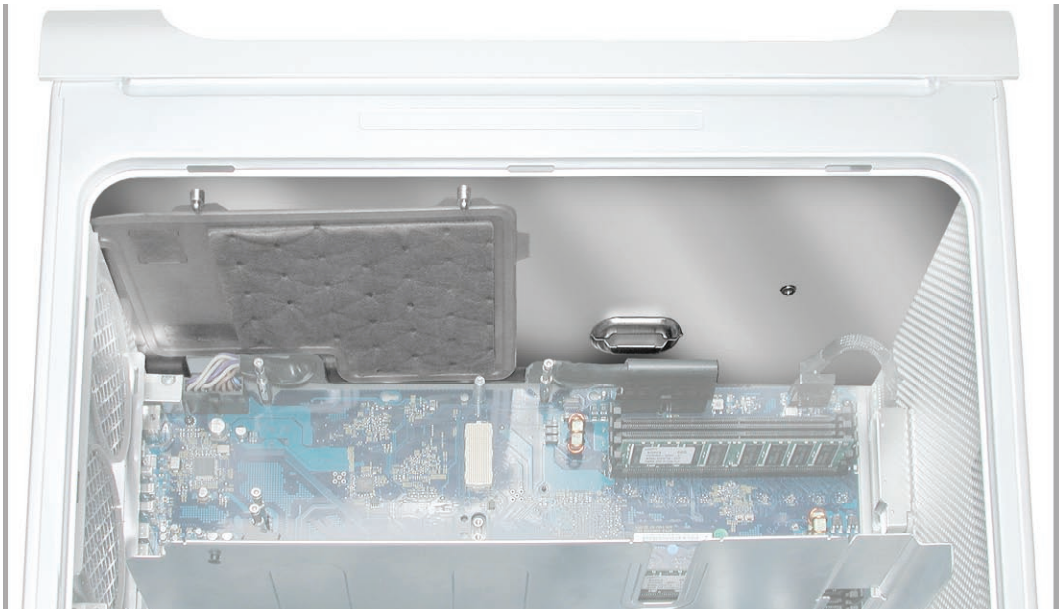
The only tools required for this procedure are a long-handled and a short-handled Phillips screwdriver.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

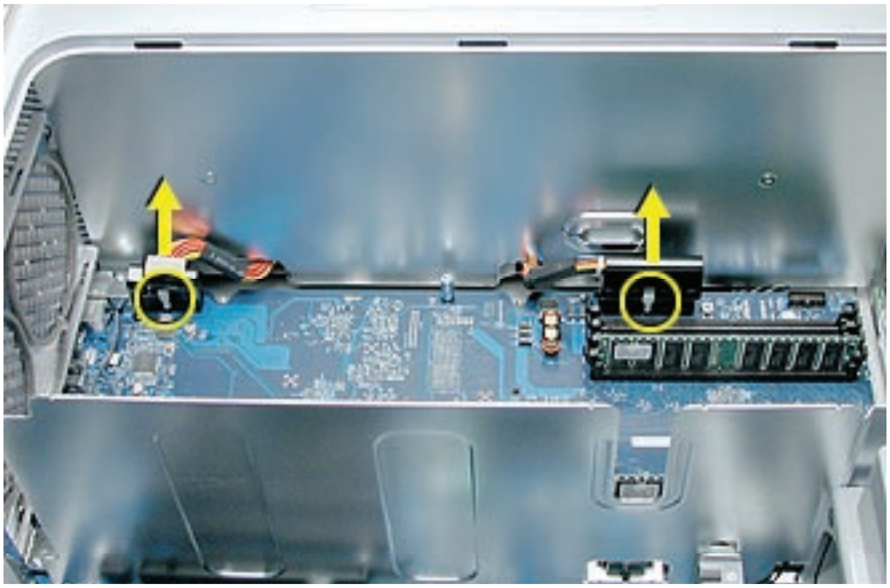
- Front inlet fan assembly
- Heatsink cover
- Processor
- All AGP and PCI cards
- Rear exhaust fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable

Part Location

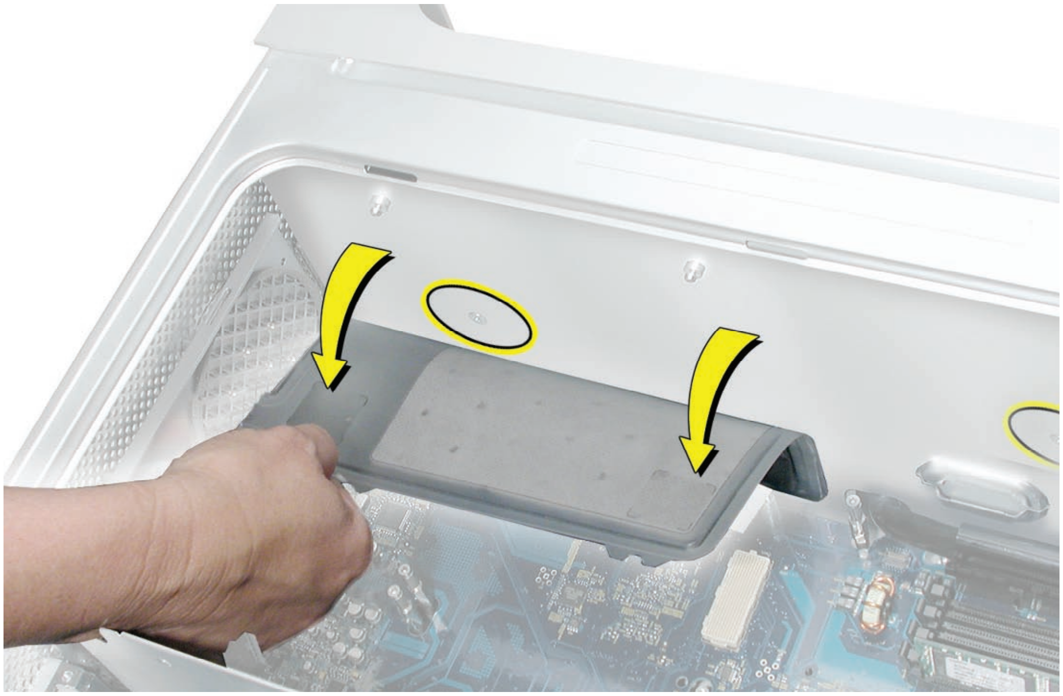


Procedure

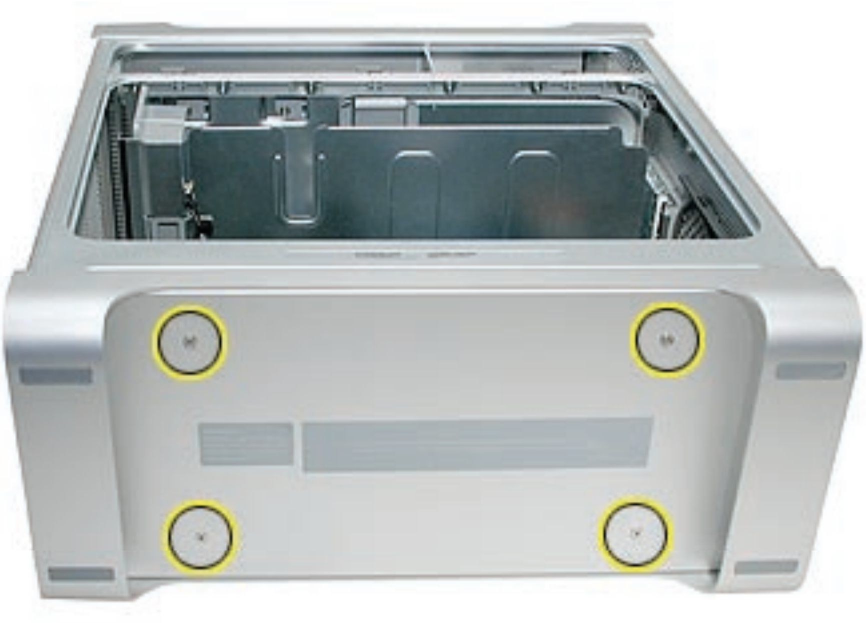
1. Position the computer so the power supply is at the top. Remove the black plastic caps covering the two power supply cable connectors.
   Note: The caps fit tightly over the connectors. To remove them, rock the caps gently forward and backward as you lift up.
2. Disconnect the cables from the logic board.



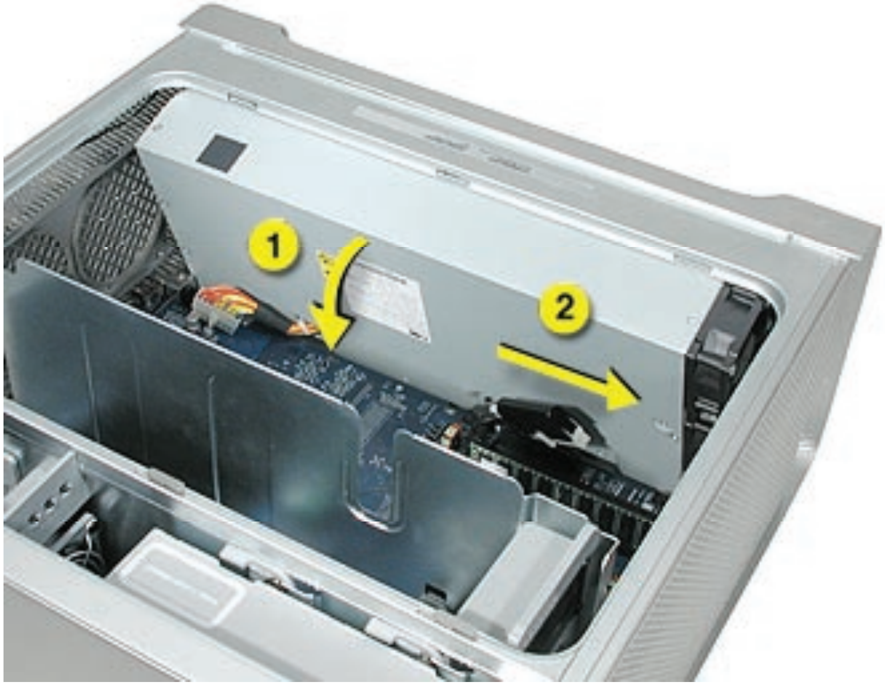
3. Remove the two screws that secure the power supply top cover, and remove the cover from the enclosure.



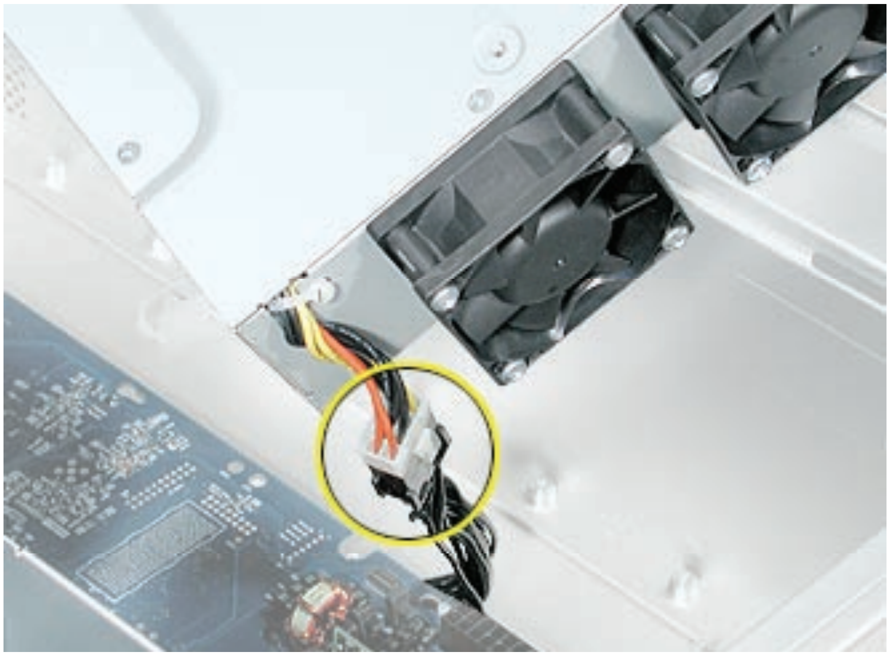
4. Remove the four power supply mounting screws on the bottom of the enclosure.



5. Push in on the power receptacle, and slide the power supply toward the front of the computer.
6. Tilt the power supply a short distance out of the bottom of the enclosure.

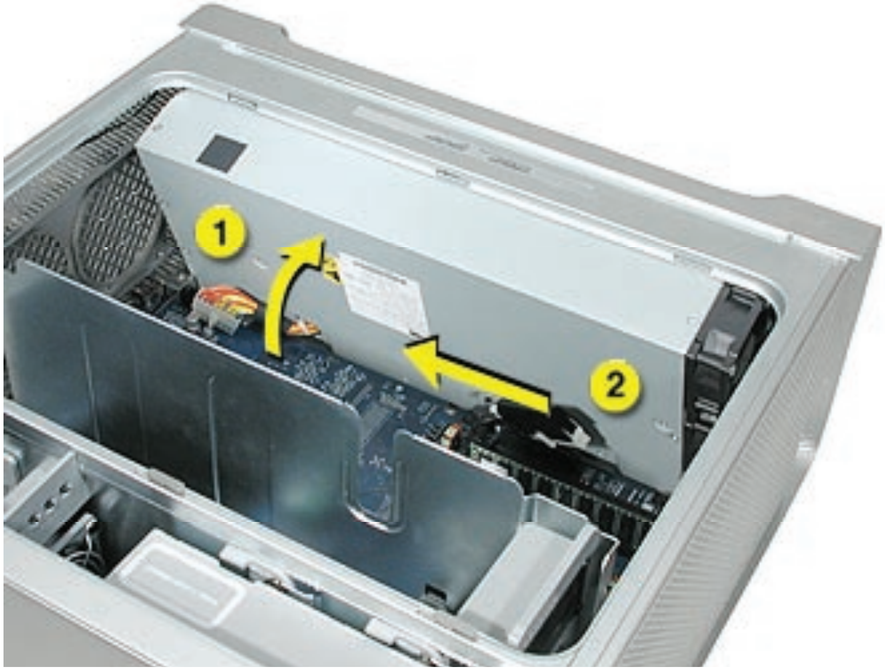


7. Disconnect the power harness cable from the power supply.



8. Remove the power supply from the enclosure.

Replacement Note: After reconnecting the power supply to the power harness cable, slightly lift the cable so that it does not become wedged under the power supply, and lower the power supply into the enclosure. Rotate the power supply back flush with the enclosure bottom until it snaps into place. Then slide the power supply toward the back of the computer, making sure the power receptacle aligns with the opening in the back panel.



Media Bay Sensor Board

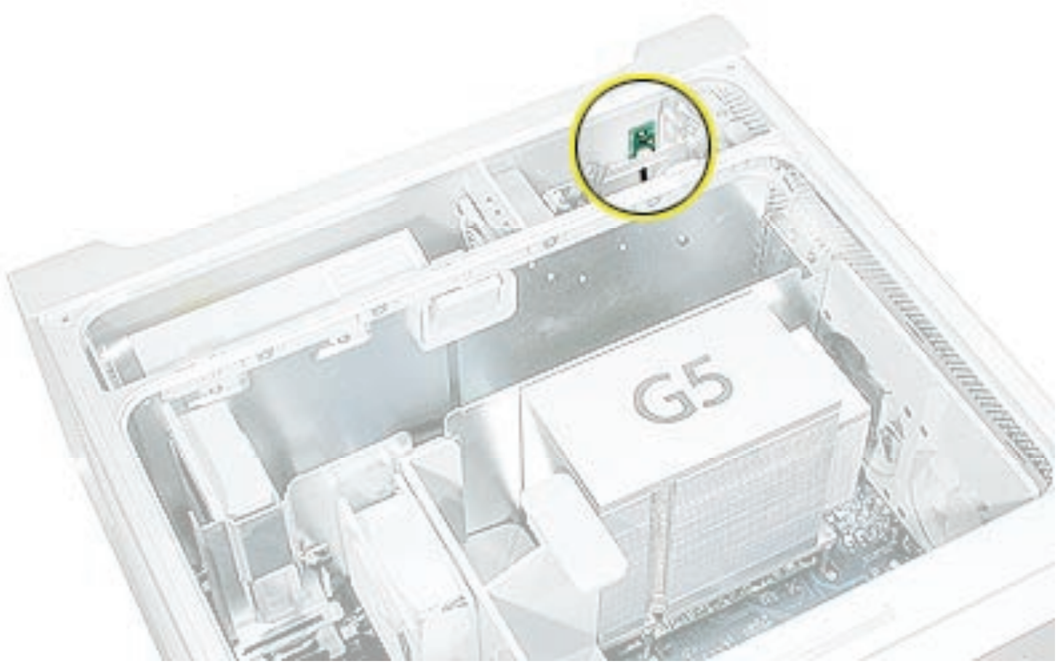
Tools

The only tool required for this procedure is a flat-blade screwdriver.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and **remove the hard drive(s)**.

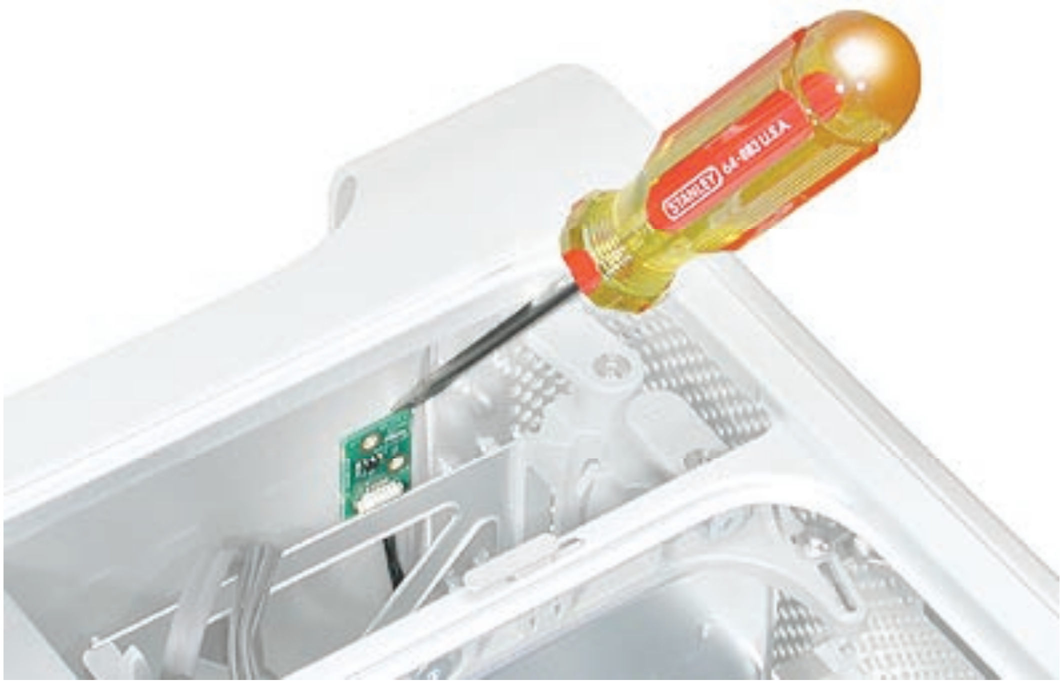
Part Location



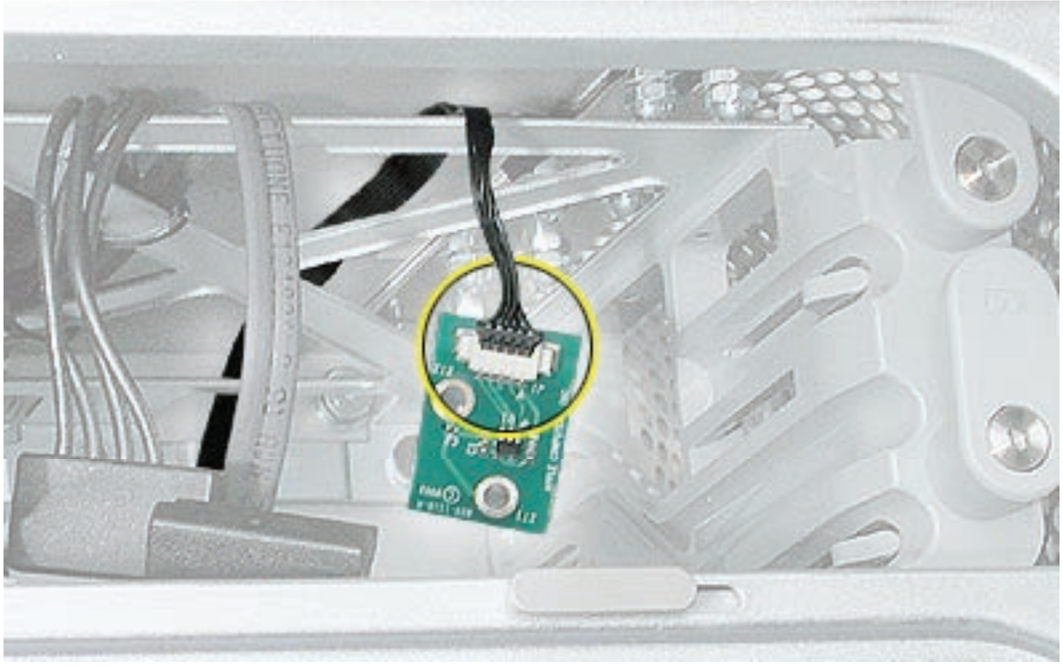
Procedure

1. Using a flat-blade screwdriver, carefully pry the sensor board from the frame.

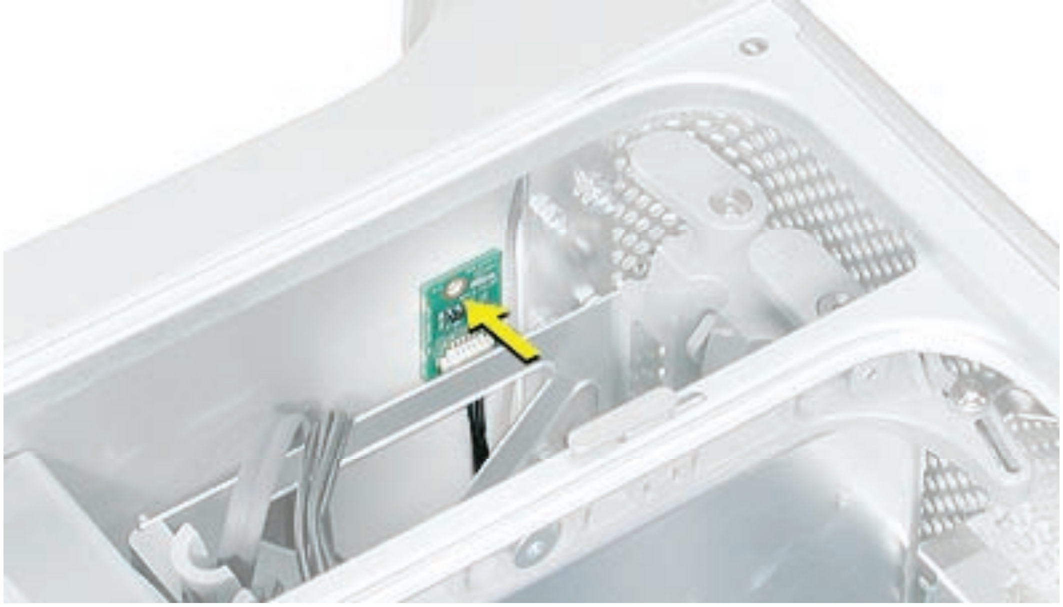
   Note: Double-stick tape on the back of the board attaches it to the frame.



2. Pull the board forward slightly so that you can reach the cable connector.
   Note: The board's cable may be taped to the frame and therefore offer some resistance. Carefully tug on the cable to release it.
3. Disconnect the media sensor board cable from the board, and remove the board from the enclosure.



Replacement Note: Before installing the replacement board, apply the double-stick tape included in the sensor board kit to the back of the board. Then reconnect the media sensor board cable and press the board to the frame in the location illustrated below.



Air Deflector Sensor Board

Tools

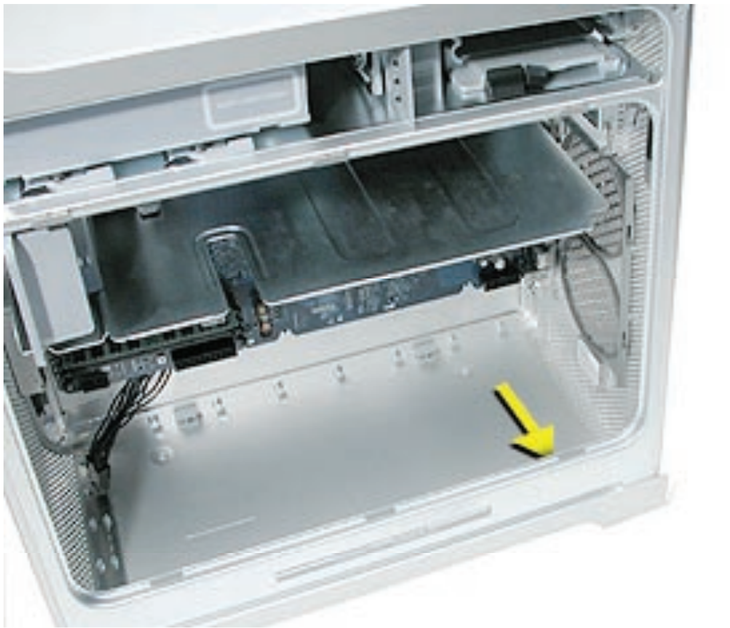
The only tools required for this procedure are a long-handled and a short-handled Phillips screwdriver. A small mirror to use in locating the board is optional.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

- Front inlet fan assembly
- Heatsink cover(s) for Power Mac G5 or
- Heatsink cover(s) for Power Mac G5 (June 2004/Early 2005)
- Processor(s) for Power Mac G5 without LCS Heatsink or
- Processor for Power Mac G5 with LCS Heatsink
- All AGP and PCI cards
- Rear exhaust fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply for Power Mac G5 without LCS Heatsink or
- Power supply for Power Mac G5 with LCS Heatsink

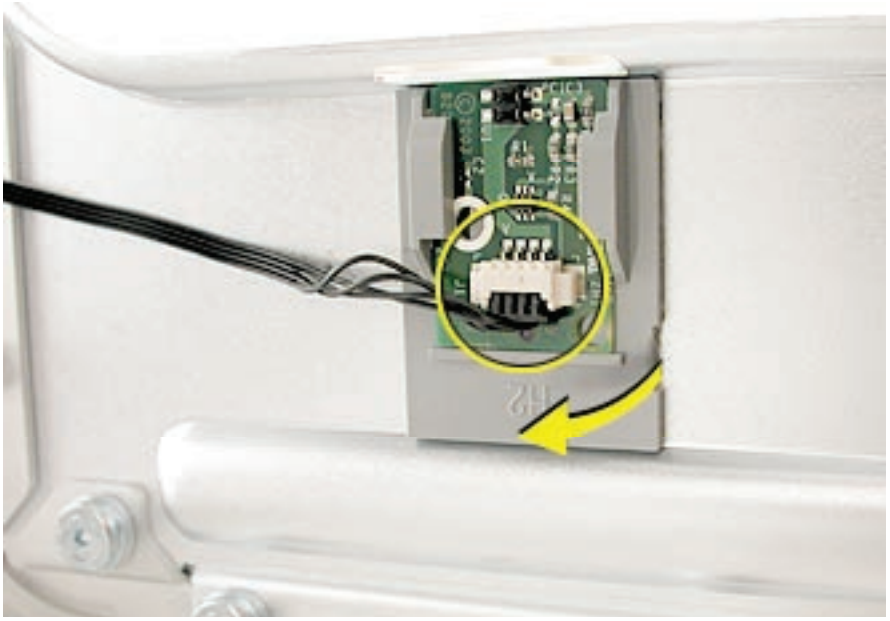
Part Location



Procedure

The air deflector sensor board is located inside the enclosure on the bottom right front corner of the frame. You may find a small mirror useful in locating the board.

1. Disconnect the sensor cable from the air deflector sensor board.
2. Pry up the sensor board from the frame and remove the board from the enclosure.
   Note: Adhesive on the back of the board attaches the sensor board to the frame.



Air Deflector Sensor Label

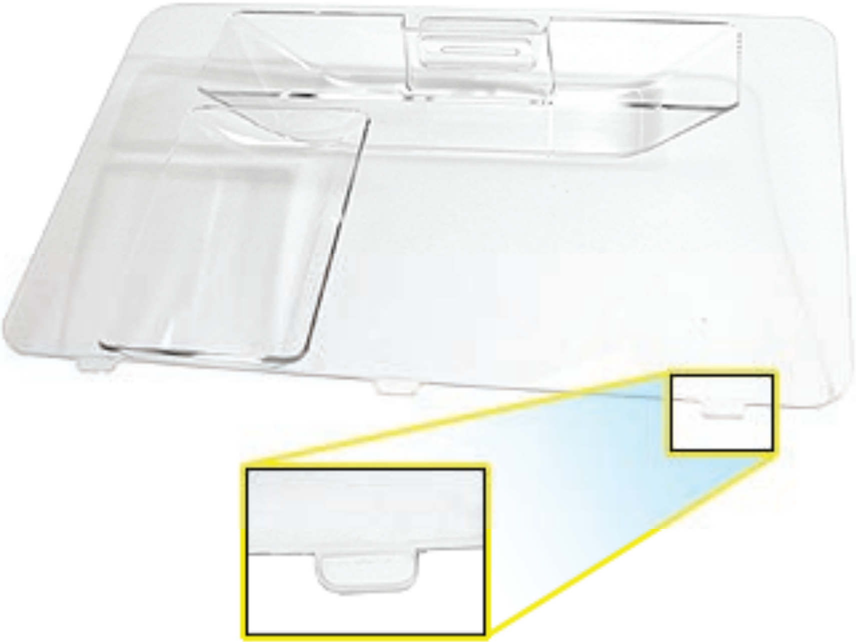
Tools

No tools are required for this procedure.

Preliminary Steps

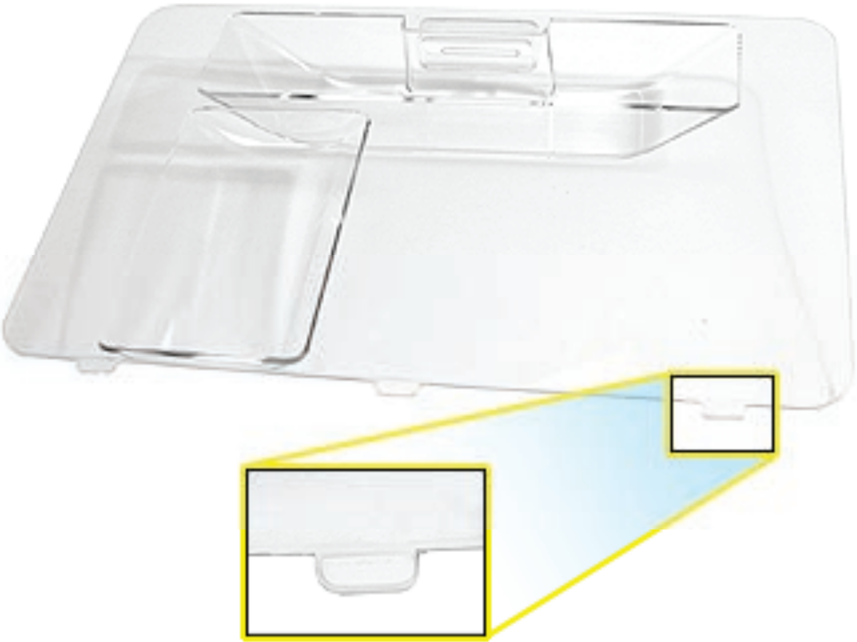
Before you begin, open the computer.

Part Location



Procedure

1. Place the air deflector on a soft, clean cloth.
2. Remove the original sensor label from the air deflector, peel off the backing from the replacement sensor label, and apply it to the air deflector as illustrated.



Logic Board: Power Mac G5

Tools

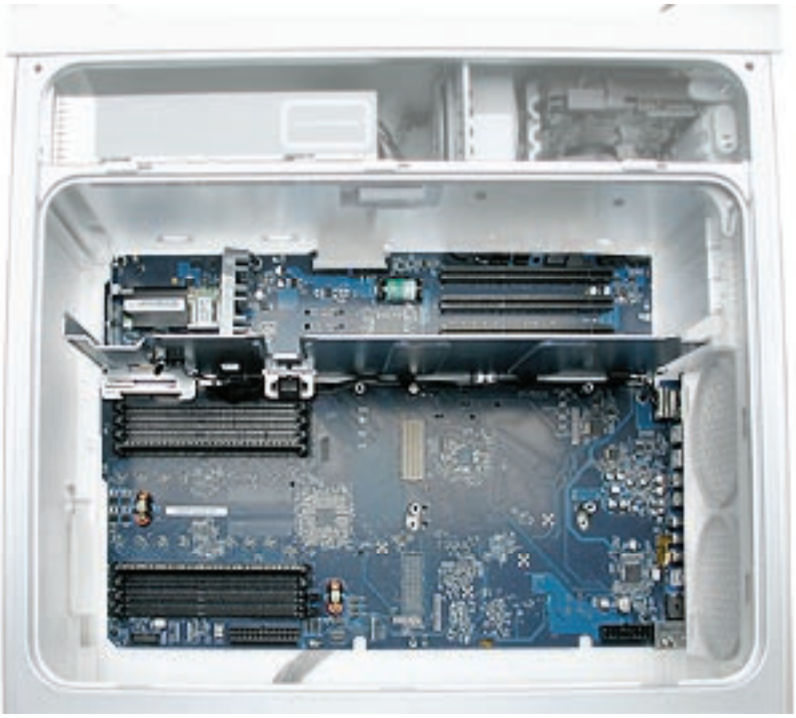
The only tools required for this procedure are a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

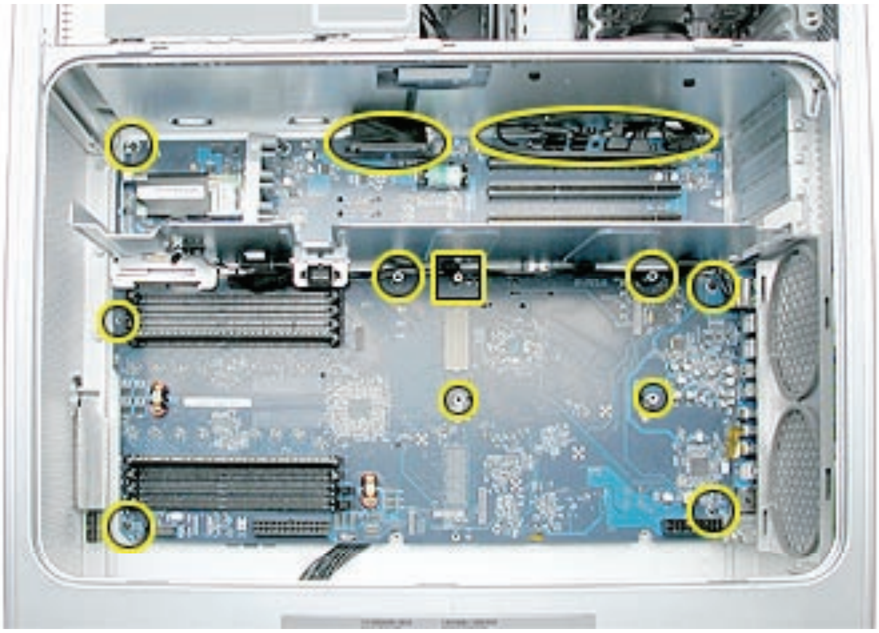
- Front inlet fan assembly
- Heatsink cover(s)
- Processor(s)
- All AGP and PCI cards
- Rear exhaust fan assembly
- PCI card guide
- Speaker/fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply

Part Location



Procedure

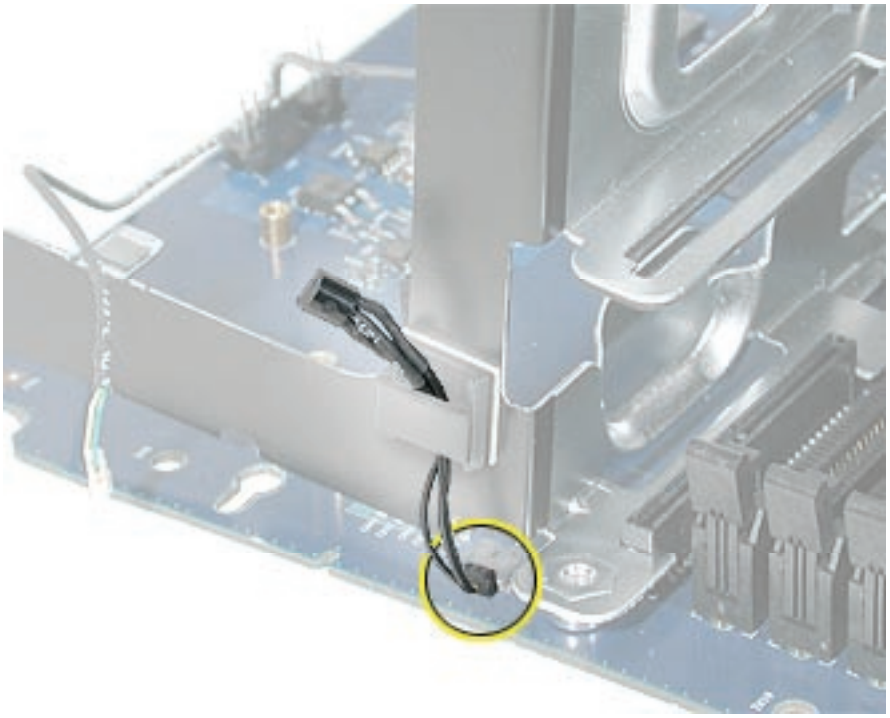
1. Disconnect the six cables from the top of the logic board.
2. Using a hex wrench, remove the four standoffs for the upper processor. Using a Phillips screwdriver, remove the remaining processor standoff (marked by a square in the illustration below). Repeat the procedure for a second processor, if installed.
3. Remove the five screws that secure the logic board.



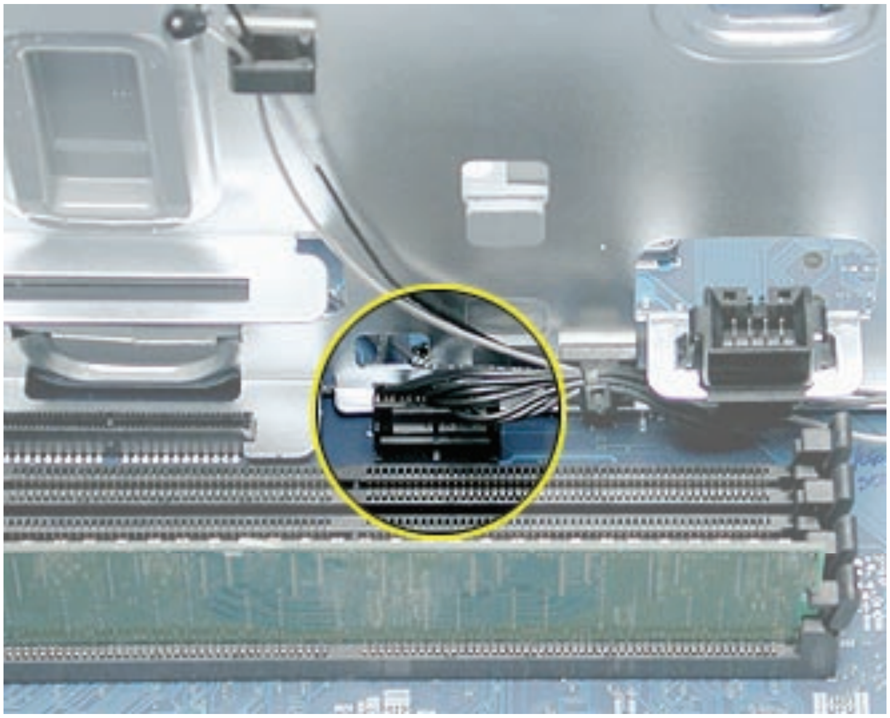
4. Carefully tilt the logic board up and maneuver it out of the enclosure, making sure the ports clear the enclosure openings.
   Note: Perform the following procedures only if you are replacing the logic board with a new logic board.
5. Transfer the following from the original logic board to the replacement board (see individual procedures in this chapter for detailed steps):
   - Memory DIMMs
   - AirPort Extreme Card (if installed)
   - Bluetooth card (if installed)
   - Modem (if installed)

6. Disconnect the thermistor from the logic board.

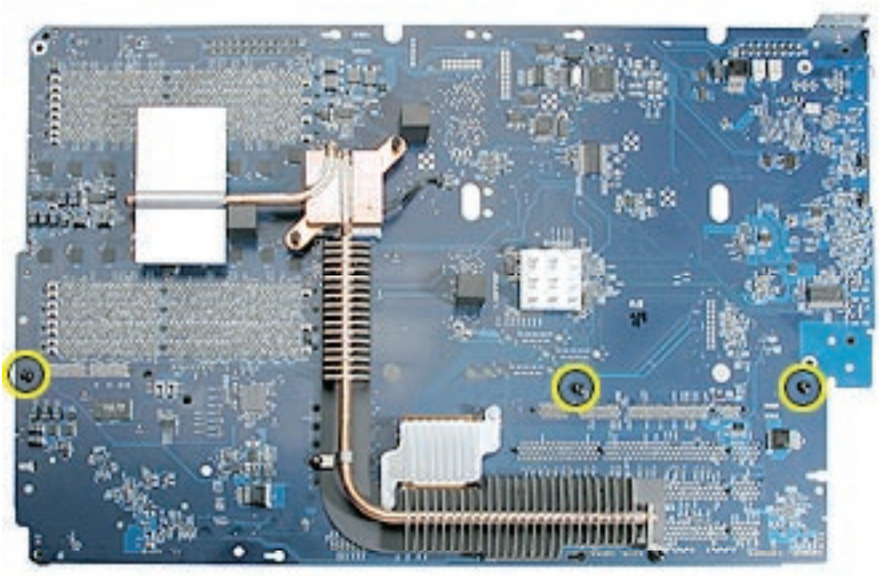
   Warning: You must disconnect the thermistor from the logic board or you will damage the logic board when you remove the PCI divider in step 9.



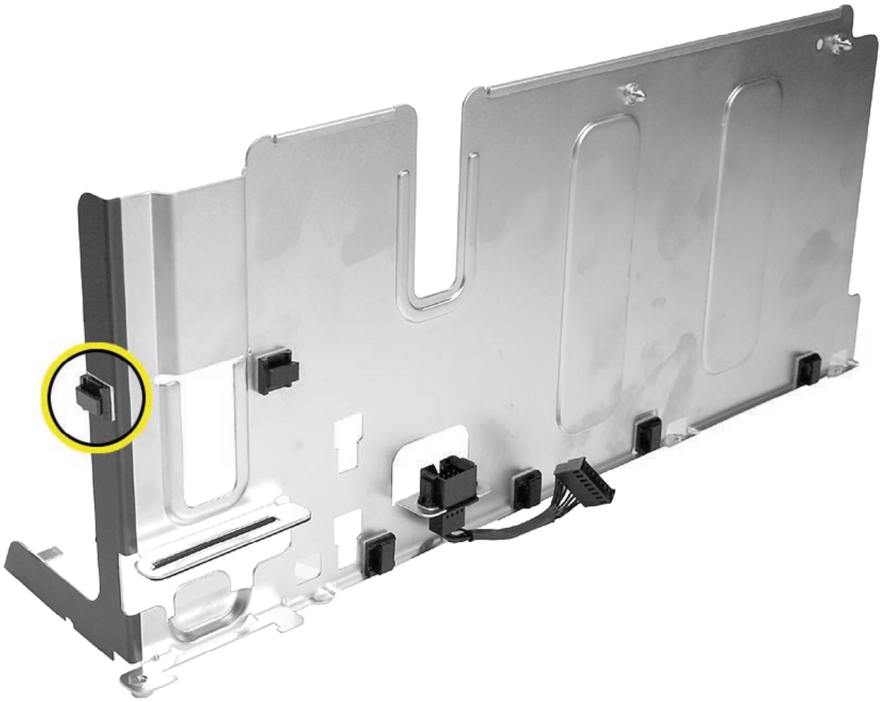
7. Disconnect the front inlet fan cable from the logic board.



8. Remove the three PCI divider mounting screws and remove the divider (with PCI card guide and thermistor attached) from the logic board.

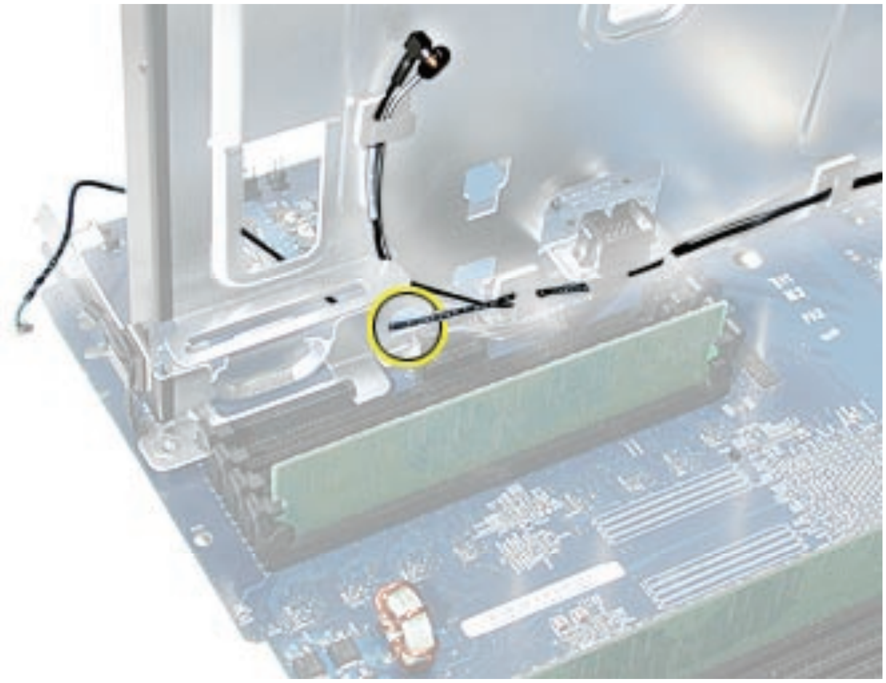


Replacement Note for Power Mac G5 (June 2004 Dual 1.8 GHz): If the original logic board routed the modem filter board and antenna board cables on top of the board, and you are installing a replacement logic board that routes the cables under the board, you must add a cable guide (bundled with the replacement logic board) to the side of the PCI divider. You will use this guide to hold the cables for modem, AirPort, and Bluetooth cards if these cards are not installed in the computer.



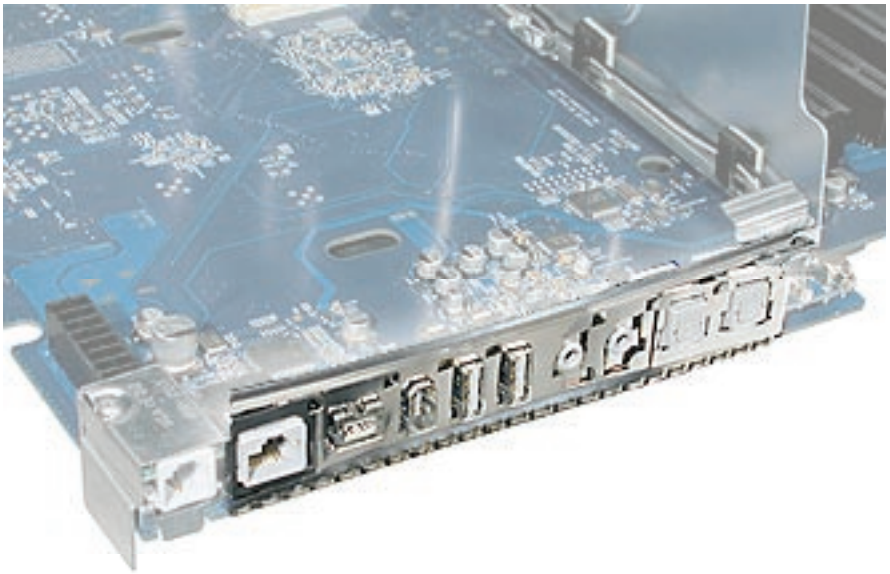
9. Position the PCI divider on the replacement logic board and install the three mounting screws.
10. Connect the thermistor and front inlet fan cable to the logic board.

11. Route the modem filter board cable and antenna board cables along the PCI divider.
    Note: Be careful that the cables route under the black connector for the front inlet fan. In addition, make sure that the cables are in place behind all cable guides and that the modem filter cable routes out through the correct opening in the PCI divider.



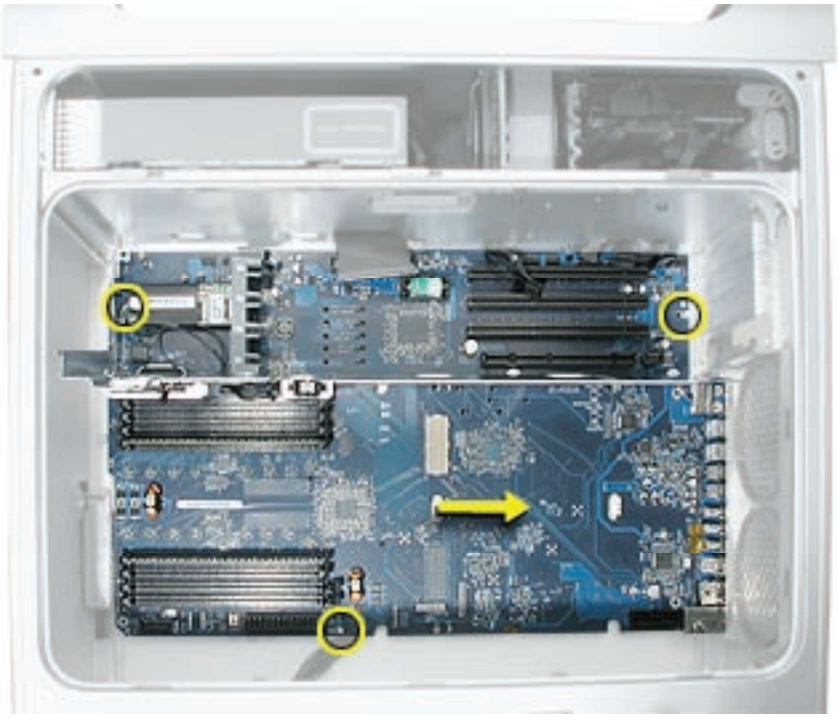
12. Connect the modem filter cable to the modem and install the modem on the logic board.
13. Install the AirPort Extreme Card and Bluetooth card on the logic board and connect their cables to the cards.
14. Install the memory DIMMs on the logic board.

15. Transfer the port EMI shield from the original logic board to the replacement logic board, making sure the shield is fully seated on the ports.

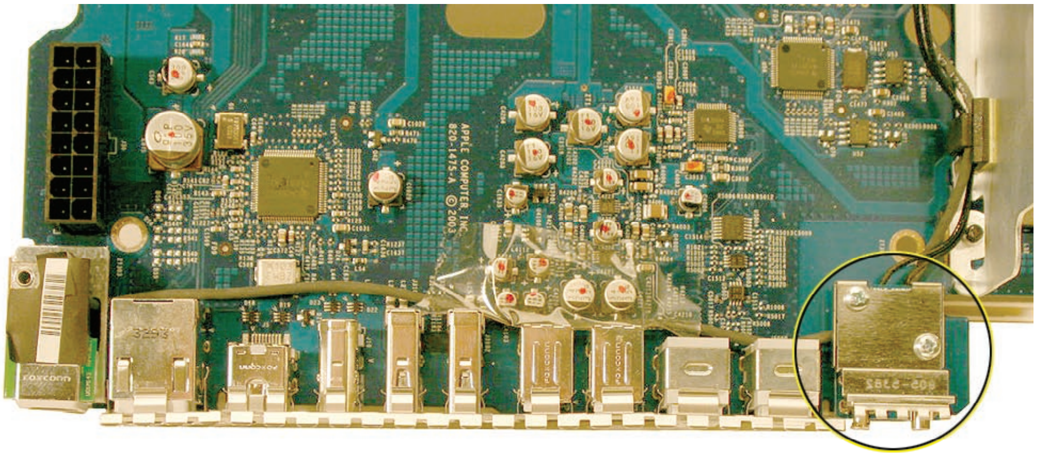


Replacement Procedure

1. Temporarily tape the top six cables to the media shelf so that they are out of the way.
   Note: You may find a long strip of packing tape useful in securing the cables.
2. Angle the logic board into the enclosure so that the port edge goes in first.
3. Position the logic board on the three guide pins, aligning the ports with the openings in the enclosure.
4. Slide the board toward the rear of the computer so that the logic board locks onto the guide pins and the ports are fully seated in the back panel openings.



Note: When installing the logic board into the computer, make sure the antenna board shield is not bent back away from the case. The shield should touch the case when the logic board is fully installed.



5. Replace the logic board screws and standoffs.
6. Connect the six cables at the top of the logic board to the board.
7. Replace the power supply and reconnect all power supply cables to the logic board.
8. Replace the front panel board cable.
9. Replace the speaker/fan assembly and reconnect its cables to the logic board.
10. Replace the PCI card guide.
11. Replace the rear exhaust fan assembly and reconnect its cable to the logic board.
12. Replace all AGP and PCI cards.
13. Replace the processor(s).
14. Replace the heatsink cover(s).
15. Replace the front inlet fan assembly.

Logic Board: Power Mac G5 (June 2004/Early 2005)

Note: Most Power Mac G5 (June 2004/Early 2005) computers route the antenna board cables and modem filter board cable on the underside of the logic board. However, some Power Mac G5 (June 2004 Dual 1.8 GHz) computers route the antenna board and modem filter board cables on the top of the logic board. If the Power Mac G5 (June 2004 Dual 1.8 GHz) logic board you are repairing routes the cables on the top of the board, see the previous procedure for "**Logic Board: Power Mac G5**."

Tools

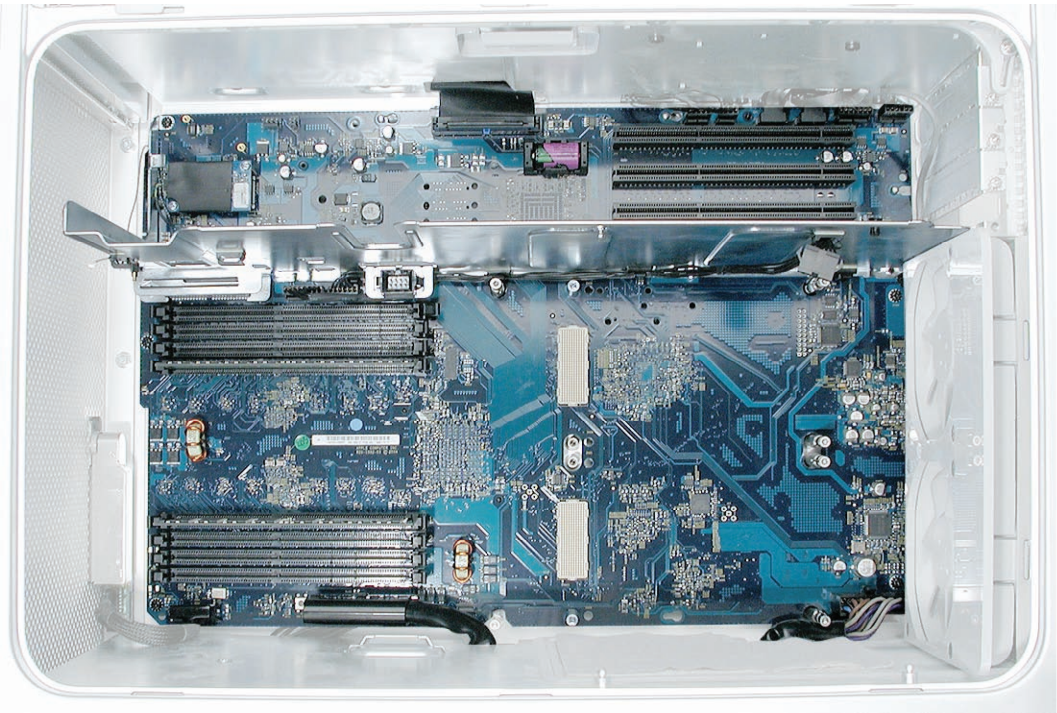
The only tools required for this procedure are a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

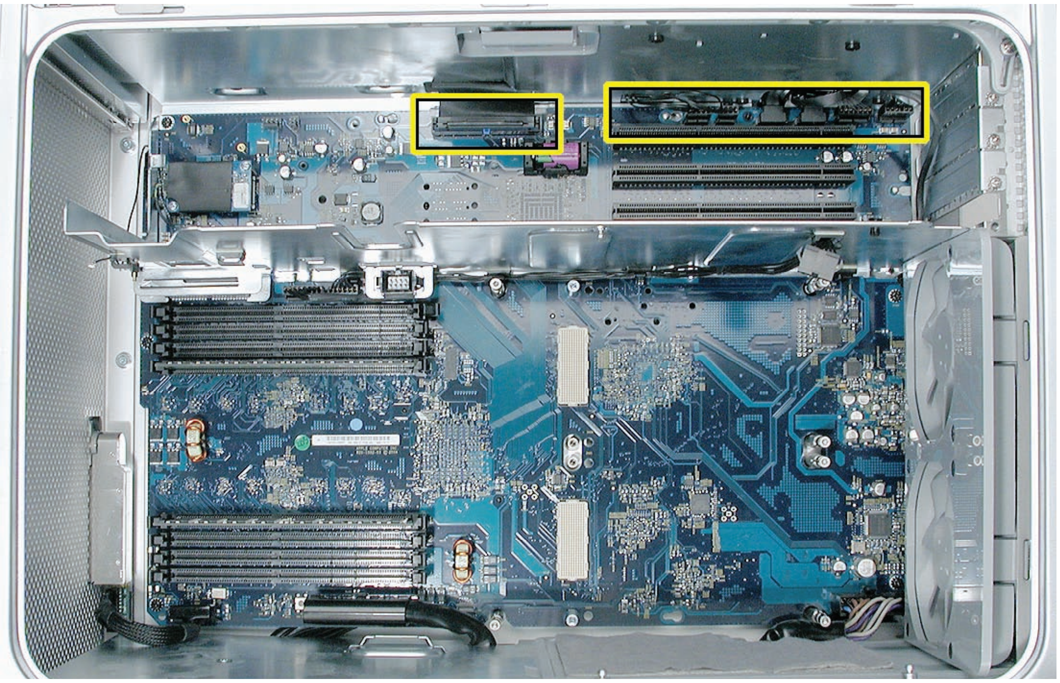
- **Front inlet fan assembly**
- **Heatsink cover(s)**
- **Processor(s) for Power Mac G5 without LCS Heatsink** or
- **Processor for Power Mac G5 with LCS Heatsink**
- **All AGP and PCI cards**
- **Rear exhaust fan assembly**
- **PCI card guide**
- **Speaker/fan assembly**
- **Front panel board cable**
- **Memory DIMM** if it is in slot next to the power supply cable
- **Power supply for Power Mac G5 without LCS Heatsink** or
- **Power supply for Power Mac G5 with LCS Heatsink**

Part Location

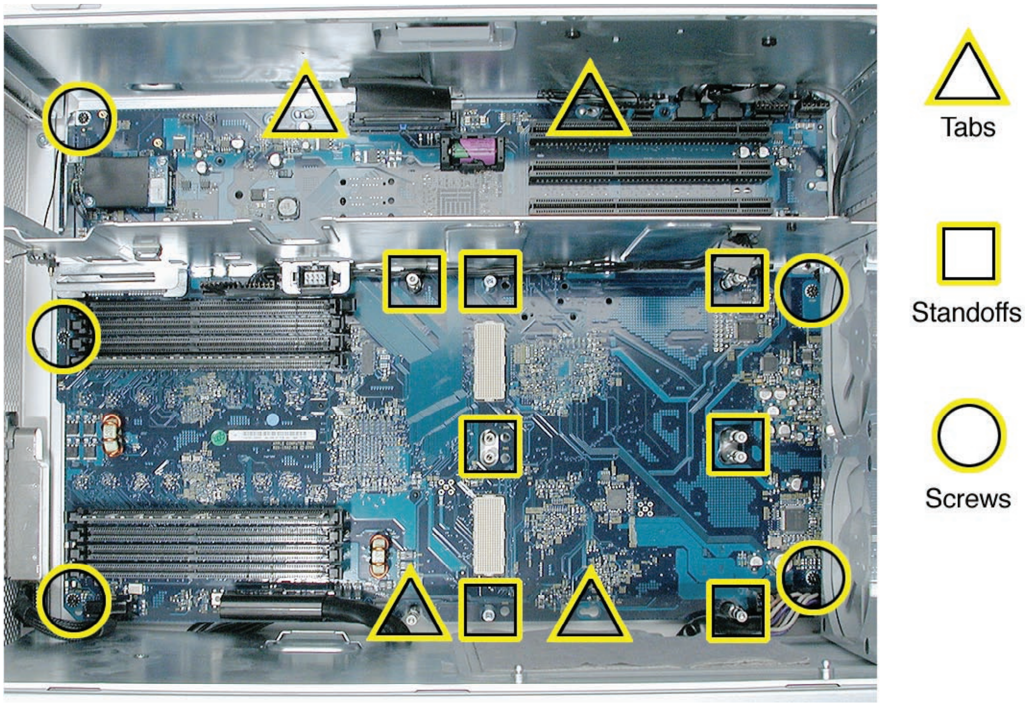


Procedure

1. Disconnect the cables from the top of the logic board.



2. Remove the 10 standoffs from the logic board (marked by a square in the illustration below).
3. Remove the five screws that secure the logic board (marked by a circle in the illustration below).

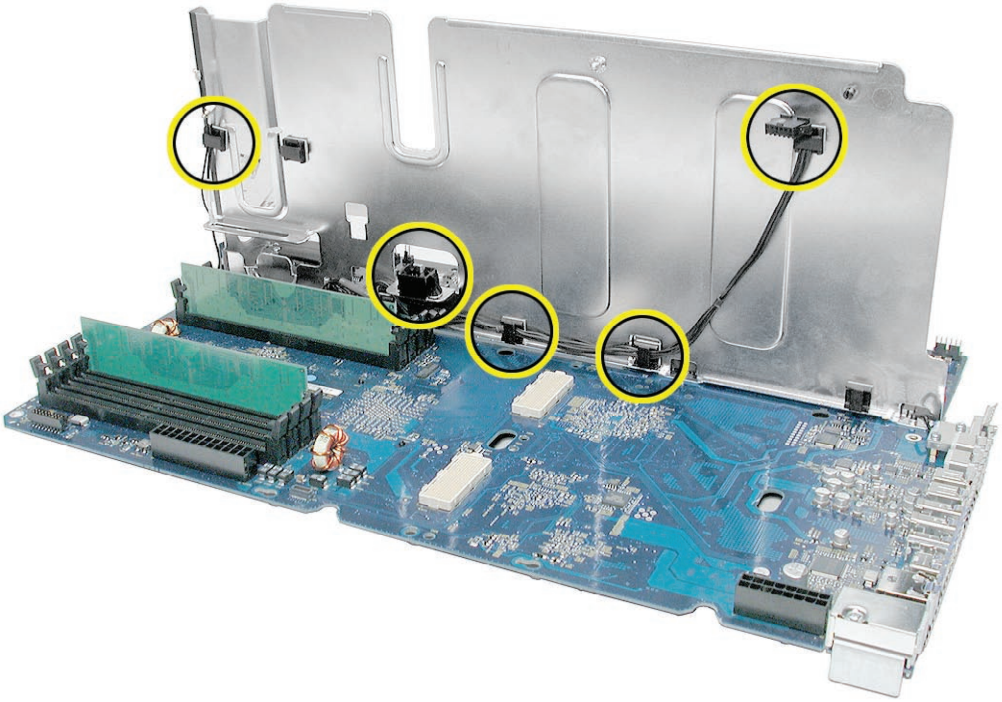


4. Carefully slide the logic board to the left to unhook the tabs (marked by a triangle in the illustration above). Tilt the logic board up and maneuver it out of the enclosure, making sure the ports clear the enclosure openings.

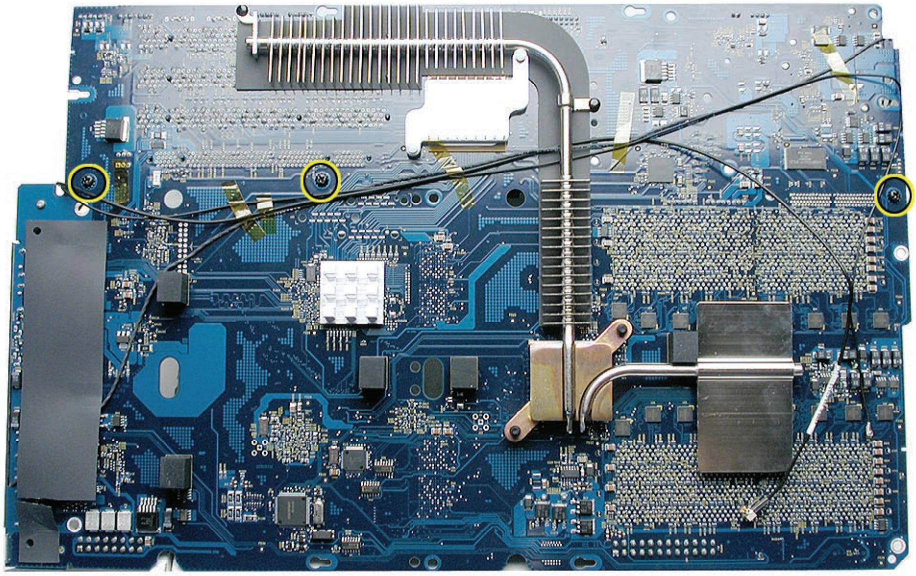
   Note: Perform the following procedures only if you are replacing the logic board with a new logic board.

5. Transfer the following from the original logic board to the replacement board (see individual procedures in this chapter for detailed steps):
   - Memory DIMMs
   - AirPort Extreme Card (if installed)
   - Bluetooth card (if installed)
   - Modem (if installed)
   - Ambient board (if installed)

6. Disconnect the cables from the logic board and from the tabs on the PCI divider.

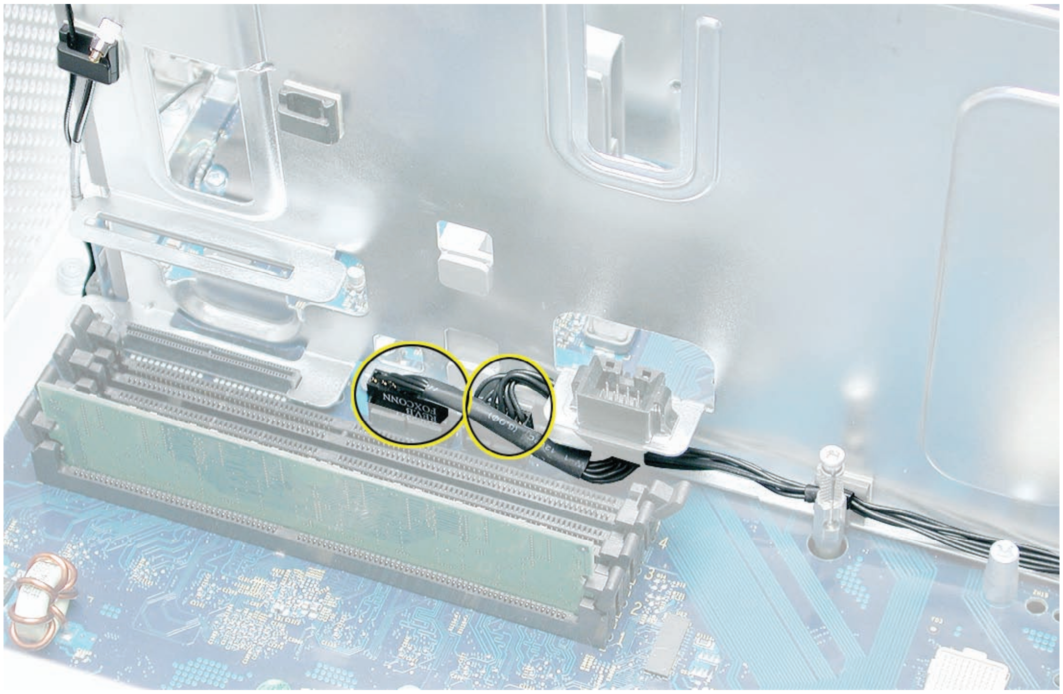


7. Turn the logic board over. Remove the three PCI divider mounting screws and remove the divider from the logic board.



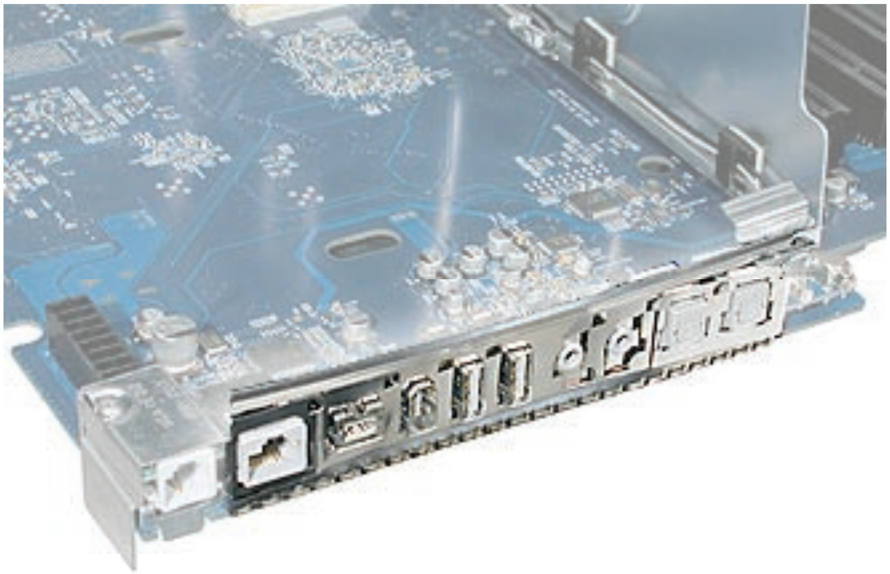
8. Position the PCI divider on the replacement logic board and install the three mounting screws.

9. Connect the cables to the logic board and clip the cables onto the PCI divider. If the Bluetooth and /or AirPort cards are not installed, clip the cables to the left side of the PCI divider as shown below.



10. Connect the modem filter cable to the modem and install the modem on the logic board.
11. Install the AirPort Extreme Card and Bluetooth card on the logic board and connect their cables to the cards.
12. Install the memory DIMMs on the logic board.

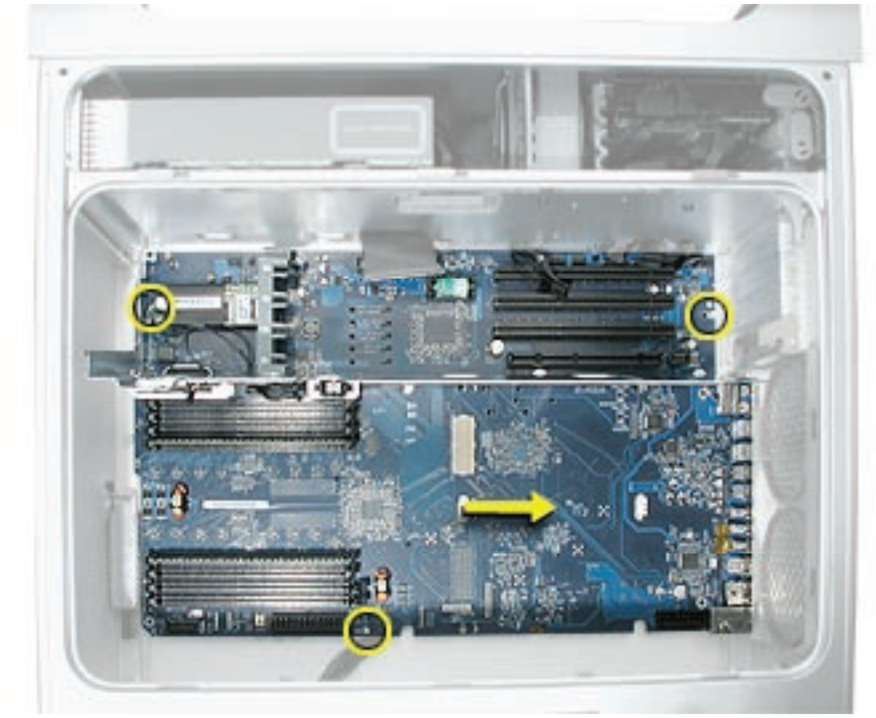
13. Transfer the port EMI shield from the original logic board to the replacement logic board, making sure the shield is fully seated on the ports.



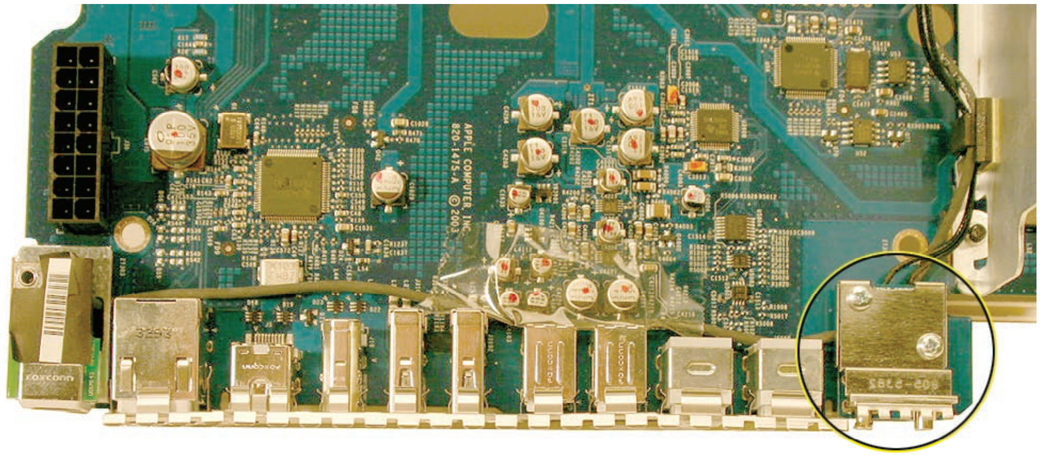
Replacement Procedure

Important: Replacement logic boards may have a mylar sheet or Kapton tape installed in the area of the processor connectors. Do not remove the mylar or tape.

1. Temporarily tape the top six cables to the media shelf so that they are out of the way.
   Note: You may find a long strip of packing tape useful in securing the cables.
2. Replace the ambient board.
3. Angle the logic board into the enclosure so that the port edge goes in first.
4. Position the logic board on the three guide pins, aligning the ports with the openings in the enclosure.
5. Slide the board toward the rear of the computer so that the logic board locks onto the guide pins and the ports are fully seated in the back panel openings.



Note: When installing the logic board into the computer, make sure the antenna board shield is not bent back away from the case. The shield should touch the case when the logic board is fully installed.



6. Replace the logic board screws and standoffs.
7. Replace the two PCI card guide screws.
8. Connect the six cables at the top of the logic board to the board.
9. Replace the power supply and reconnect all power supply cables to the logic board.
10. Replace the front panel board cable.
11. Replace the PCI card guide.
12. Replace the speaker/fan assembly and reconnect its cables to the logic board.
13. Replace the rear exhaust fan assembly and reconnect its cable to the logic board.
14. Replace all AGP and PCI cards.
15. Replace the processor.
16. Replace the heatsink cover.
17. Replace the front inlet fan assembly.

Important: Whenever you replace a logic board with a new logic board, you must run Apple Service Diagnostic (once the computer is reassembled). Apple Service Diagnostic for Power Mac G5 is available as a download from the Disc Images section of the Apple Service Source website. For more information, see "Thermal Calibration" in the Troubleshooting chapter.

Modem Filter Board and Cables: Power Mac G5 (June 2004/ Early 2005)

Note: Some Power Mac G5 (June 2004 Dual 1.8 GHz) computers route the modem filter board cables on top of the logic board. Refer to the "Modem Filter Board and Cables: Power Mac G5" procedure earlier in this chapter.

Tools

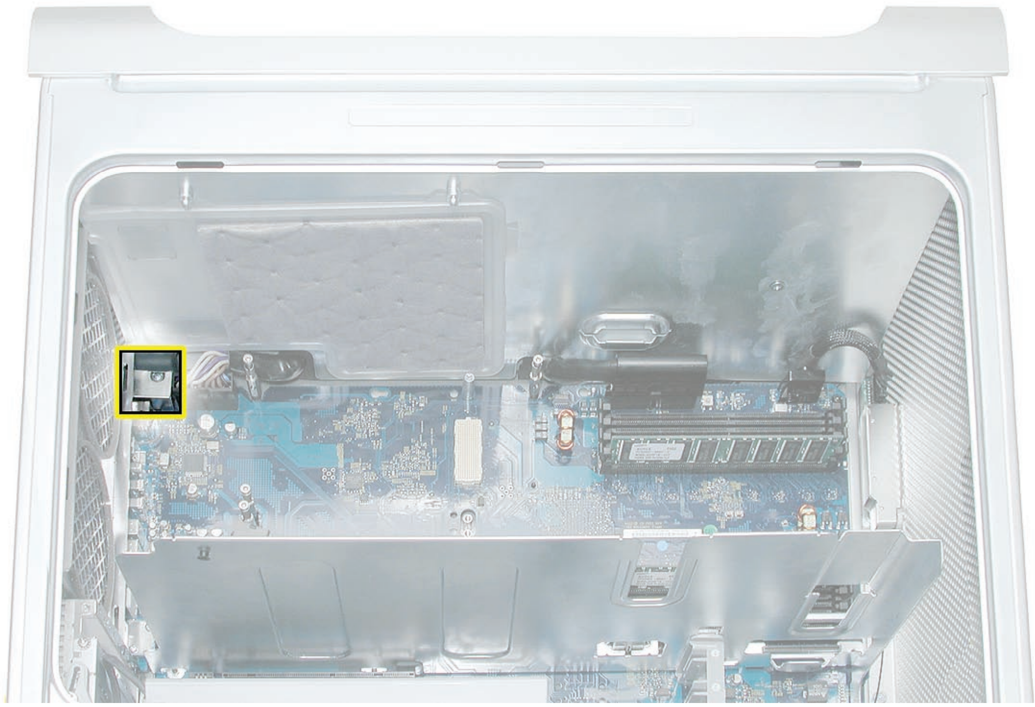
The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

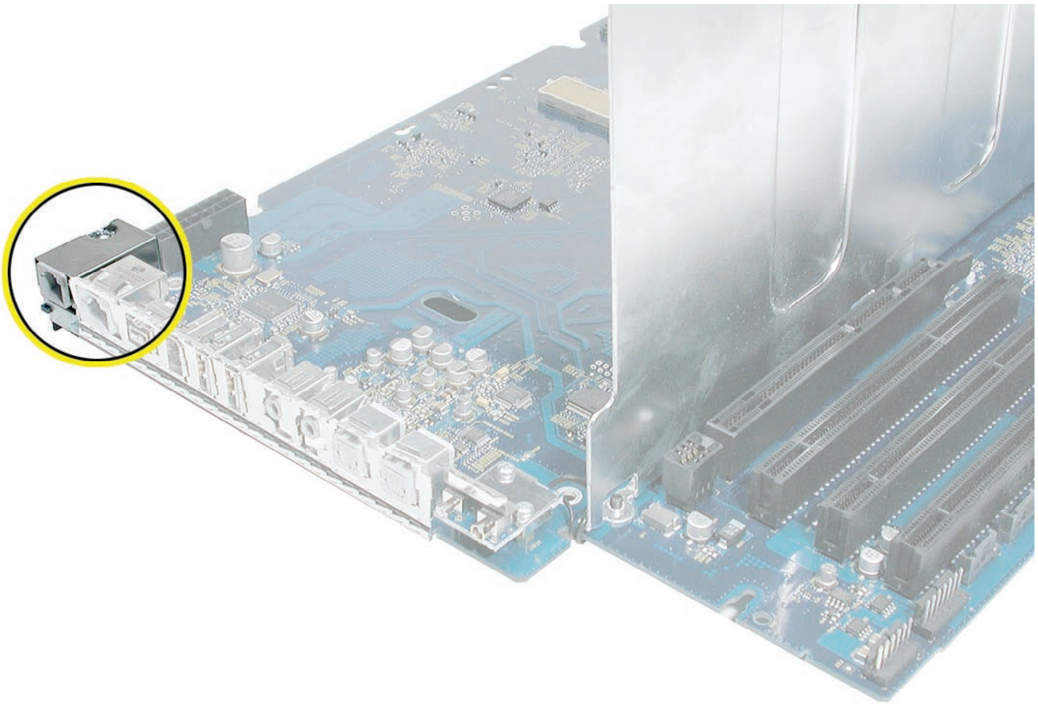
- Front inlet fan assembly
- Heatsink cover(s)
- Processor(s) for Power Mac G5 without LCS Heatsink or
- Processor for Power Mac G5 with LCS Heatsink
- All AGP and PCI cards
- Rear exhaust fan assembly
- PCI card guide
- Speaker/fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply for Power Mac G5 without LCS Heatsink or
- Power supply for Power Mac G5 with LCS Heatsink
- Logic Board

Part Location

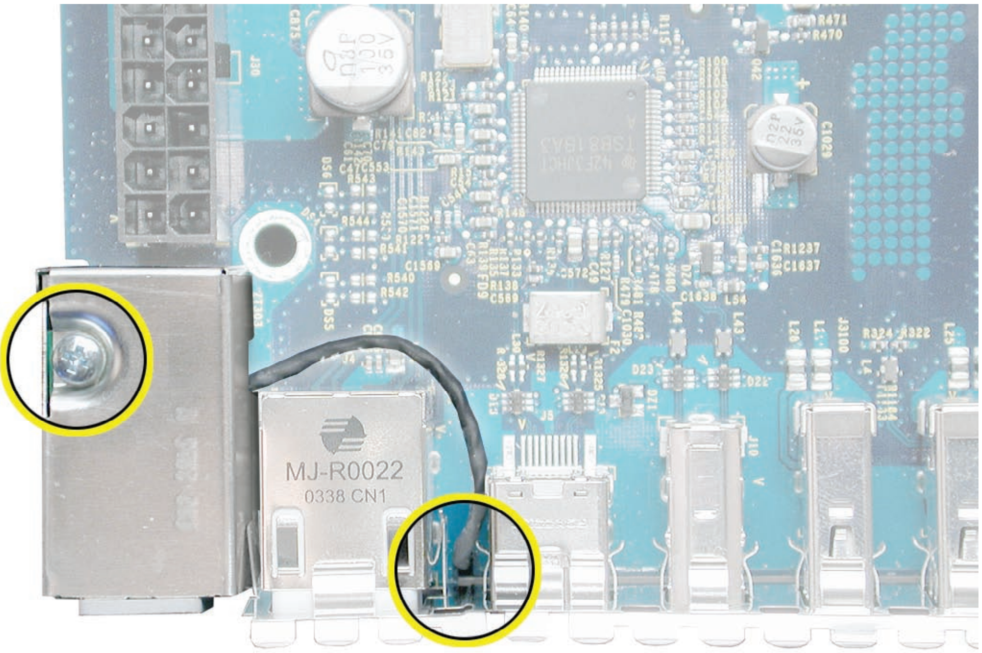


Procedure

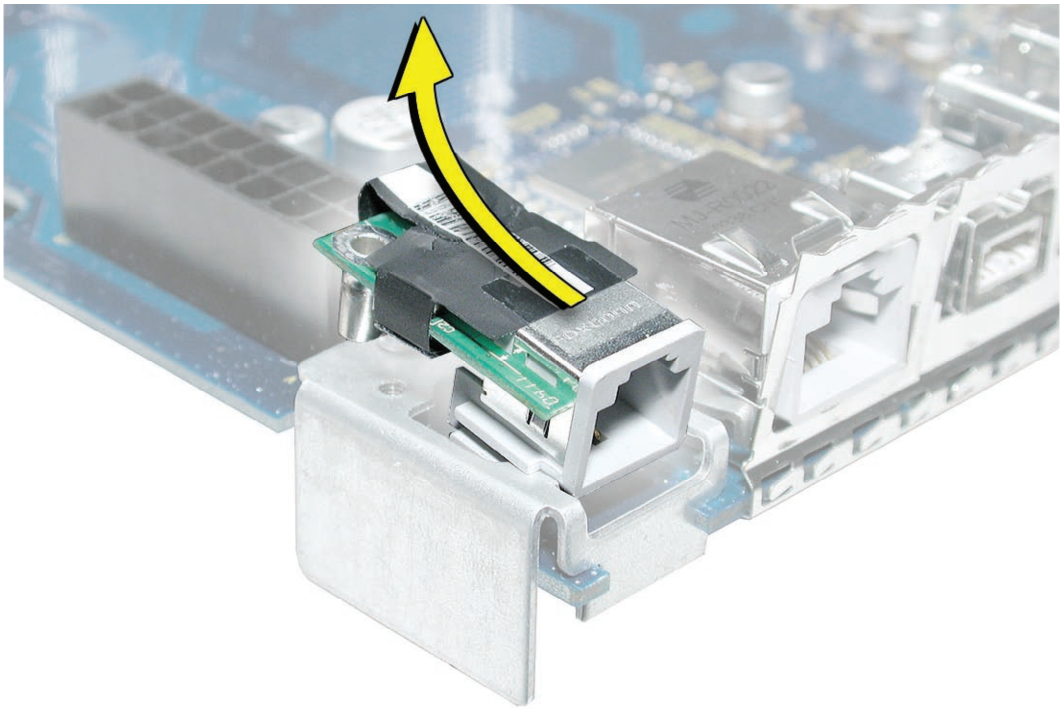
1. Locate the modem filter board on the logic board.



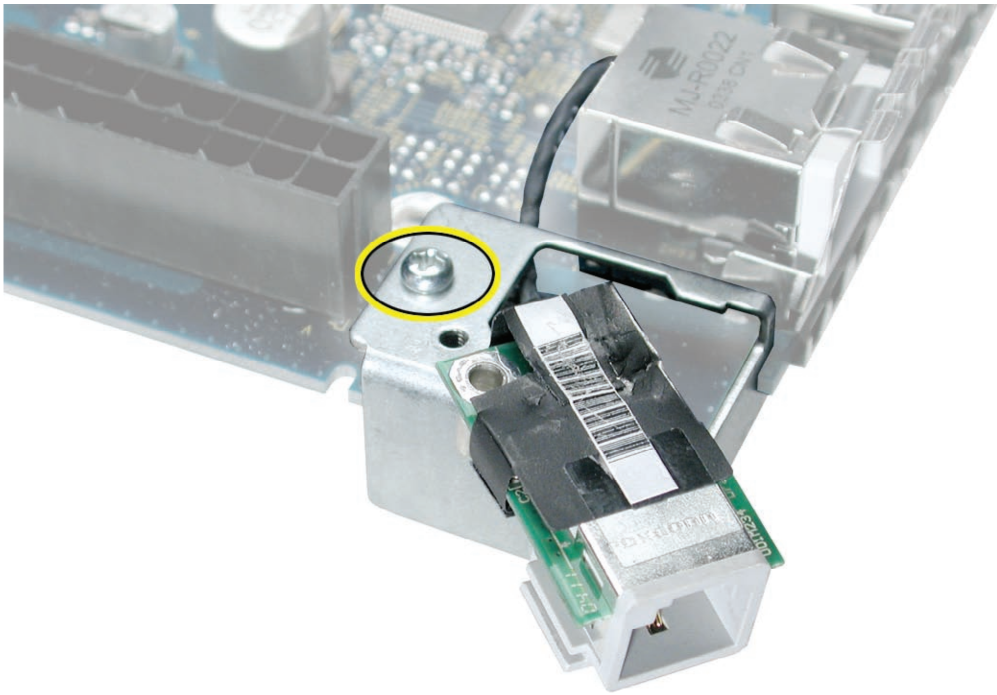
2. Remove the screw that secures the metal cover to the modem filter board. Remove the metal cover. Note: The cable routes under the logic board.



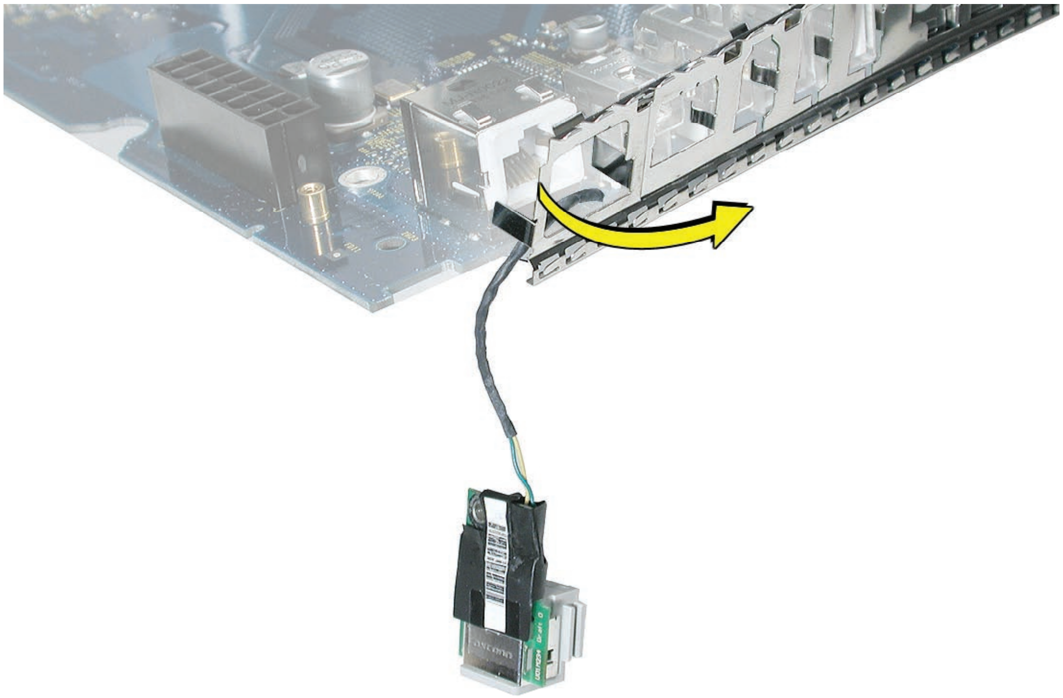
3. Slide the modem filter board off the metal frame to access another screw below the modem filter board.



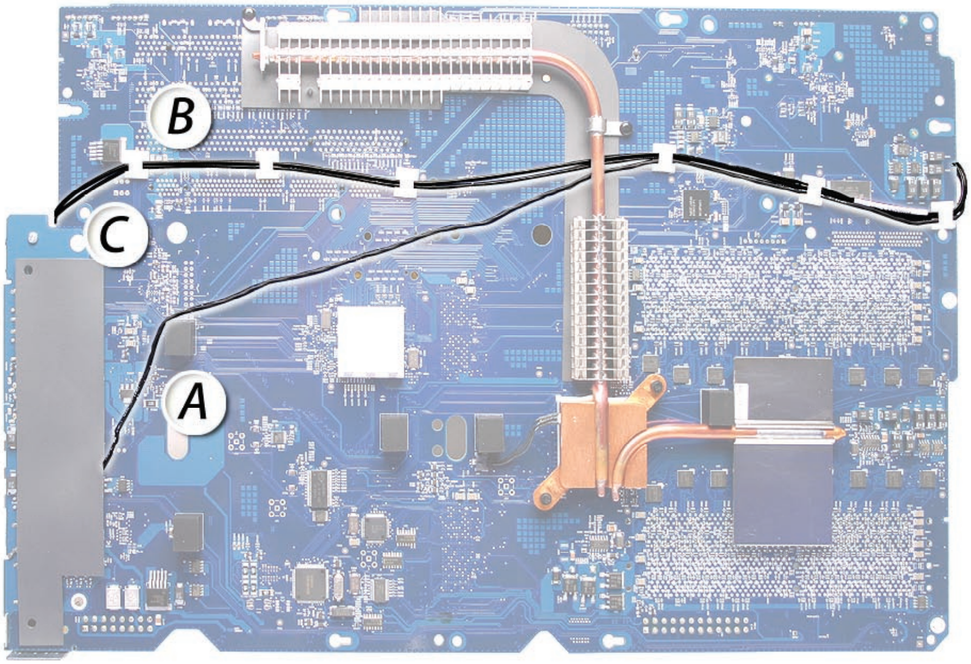
4. Remove the screw on the metal frame.



5. Pull the EMI fence away from the logic board just enough to free the modem filter board cable from the hole (see step 2) on the logic board. Note: The modem filter board, cable, and EMI are one service part.



Replacement Note: If you replace the modem filter board, its cable (A below) routes underneath the logic board. (B=AirPort cable, C=Bluetooth cable)



Antenna Board and Cables: Power Mac G5 (June 2004/ Early 2005)

Note: Some Power Mac G5 (June 2004 Dual 1.8 GHz) computers route the antenna board cables on top of the logic board. Refer to the "**Antenna Board and Cables: Power Mac G5**" procedure earlier in this chapter.

Tools

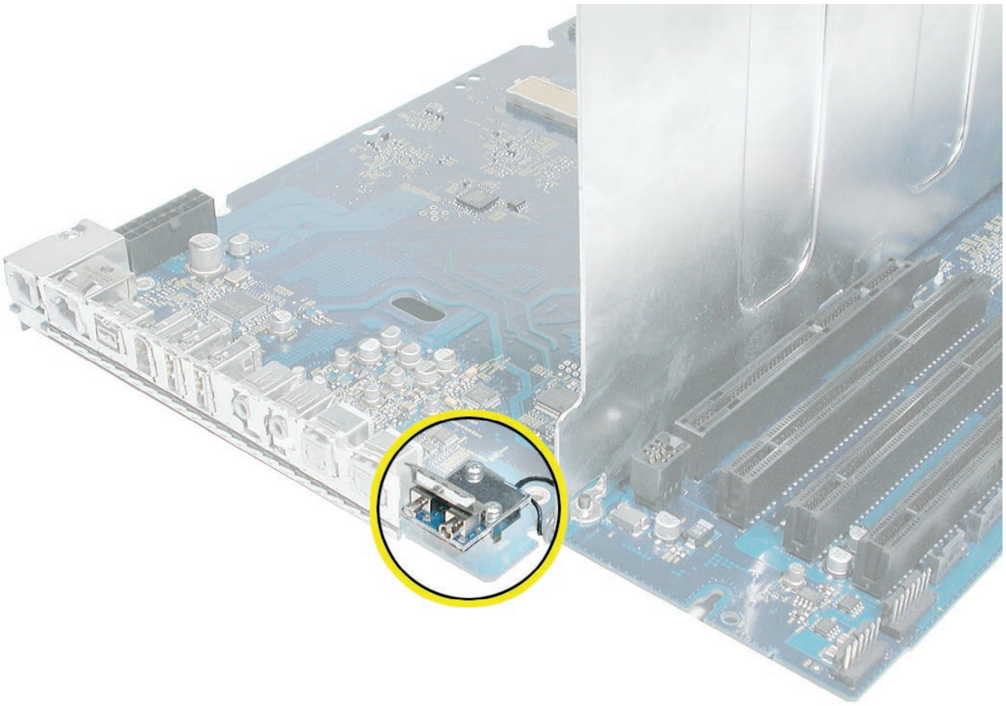
The only tools required for this procedure are a long-handled and a short-handled Phillips screwdriver.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

- **Front inlet fan assembly**
- **Heatsink cover(s)**
- **Processor(s) for Power Mac G5 without LCS Heatsink** or
- **Processor for Power Mac G5 with LCS Heatsink**
- **All AGP and PCI cards**
- **Rear exhaust fan assembly**
- **PCI card guide**
- **Speaker/fan assembly**
- **Front panel board cable**
- **Memory DIMM** if it is in slot next to the power supply cable
- **Power supply for Power Mac G5 without LCS Heatsink** or
- **Power supply for Power Mac G5 with LCS Heatsink**
- **Logic Board**

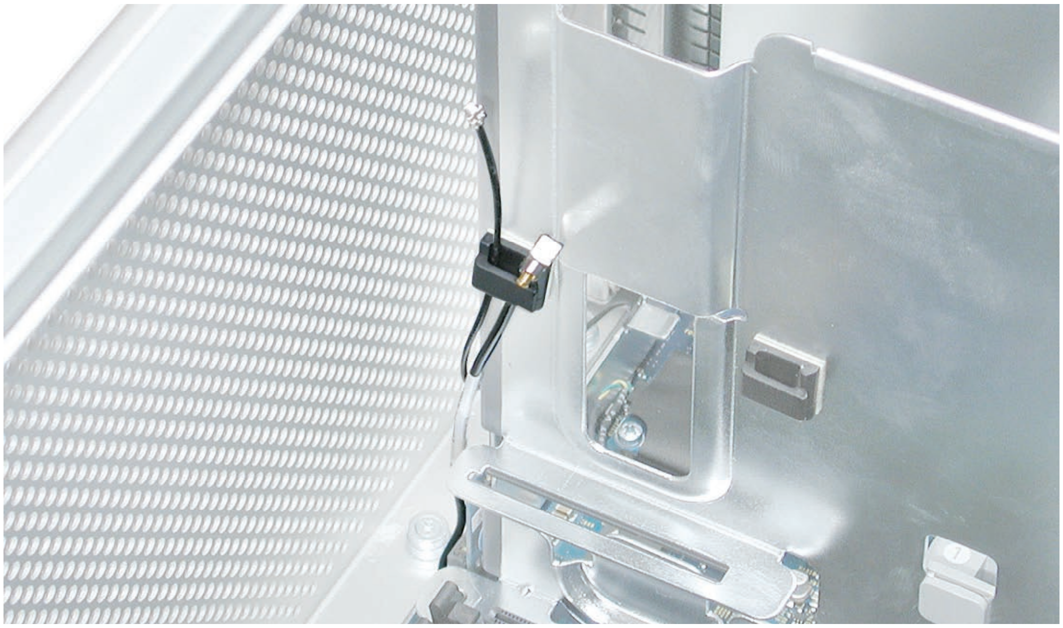
Part Location



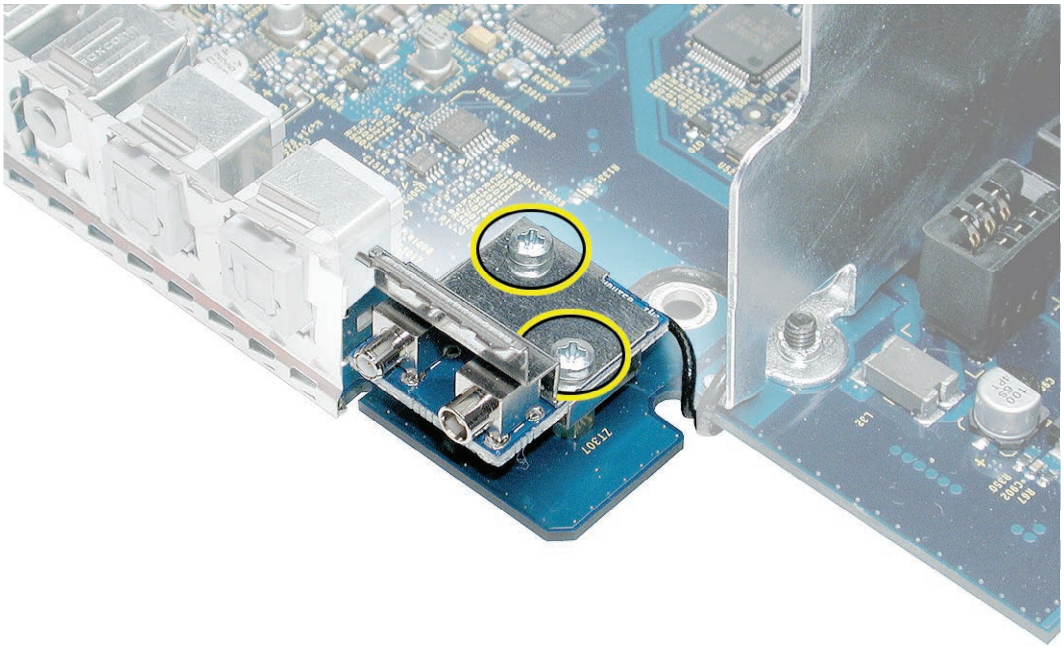
Procedure

1. Disconnect the antenna cables from the Bluetooth card and the AirPort Extreme card (if installed).

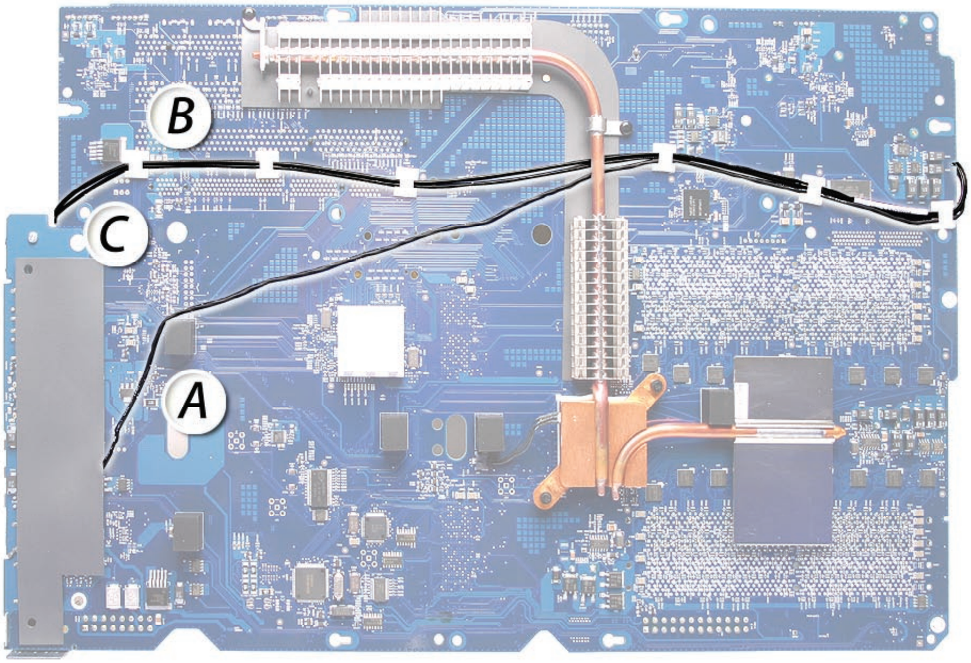
   Note: If the Bluetooth card and the AirPort Extreme card are not installed, release the cables from the clip on the PCI divider (shown below).



2. Remove the two antenna board mounting screws. Remove the board with the cables.



Replacement Note: If you replace the antenna board, its cables (B and C below) route underneath the logic board and connect to the Bluetooth card and AirPort Extreme Card on the top side of the logic board. (A=modem filter board cable)



PCI Divider: Power Mac G5

Tools

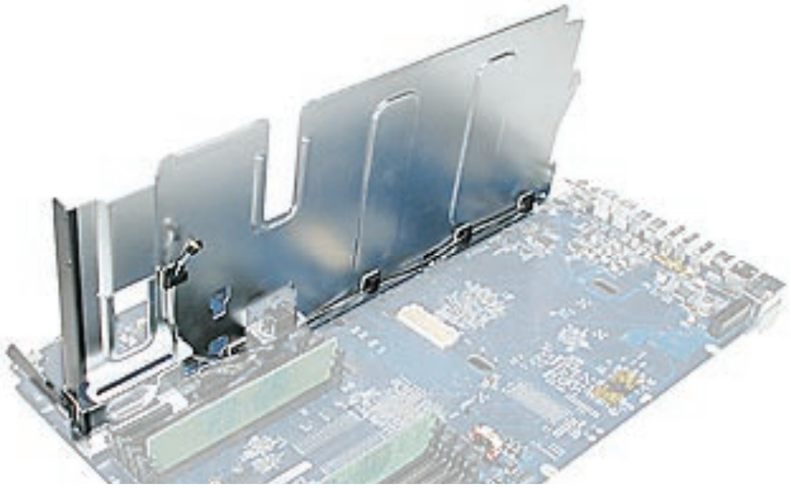
The only tools required for this procedure are a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

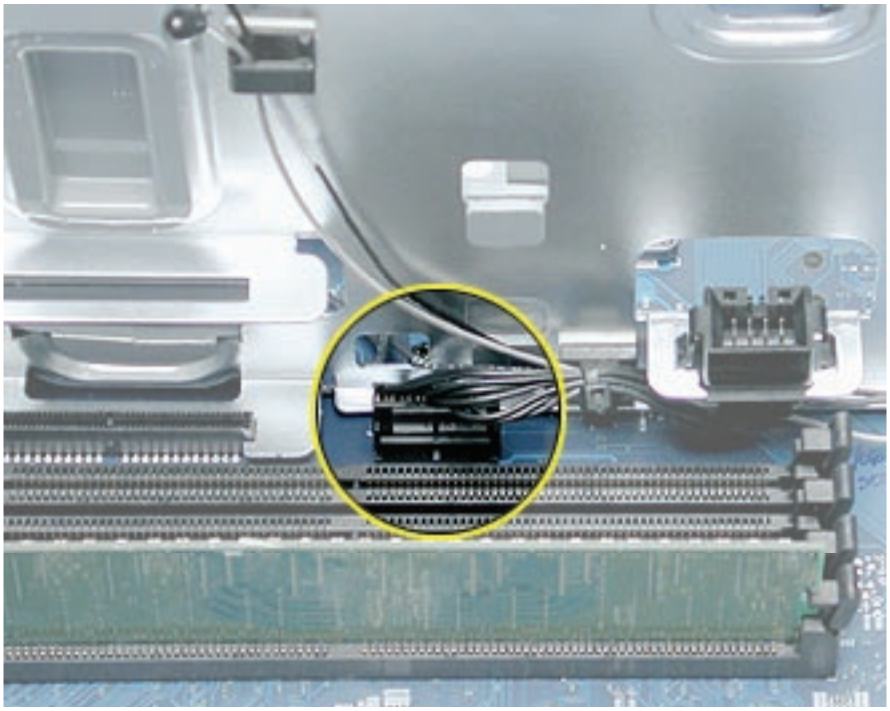
- Front inlet fan assembly
- Heatsink cover(s)
- Processor(s)
- All AGP and PCI cards
- Rear exhaust fan assembly
- PCI card guide
- Speaker/fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply
- Logic board

Part Location

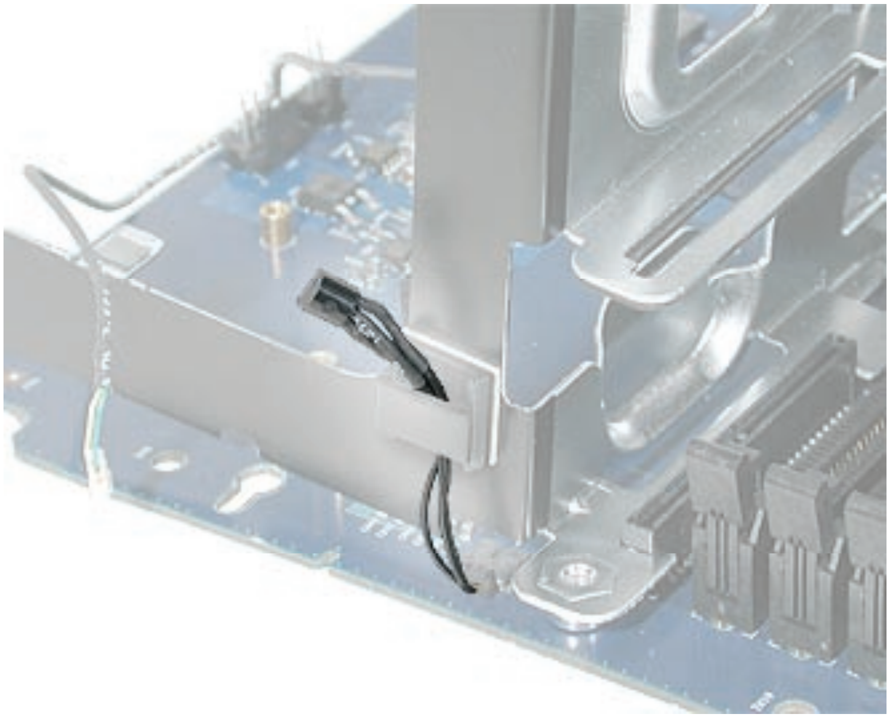


Procedure

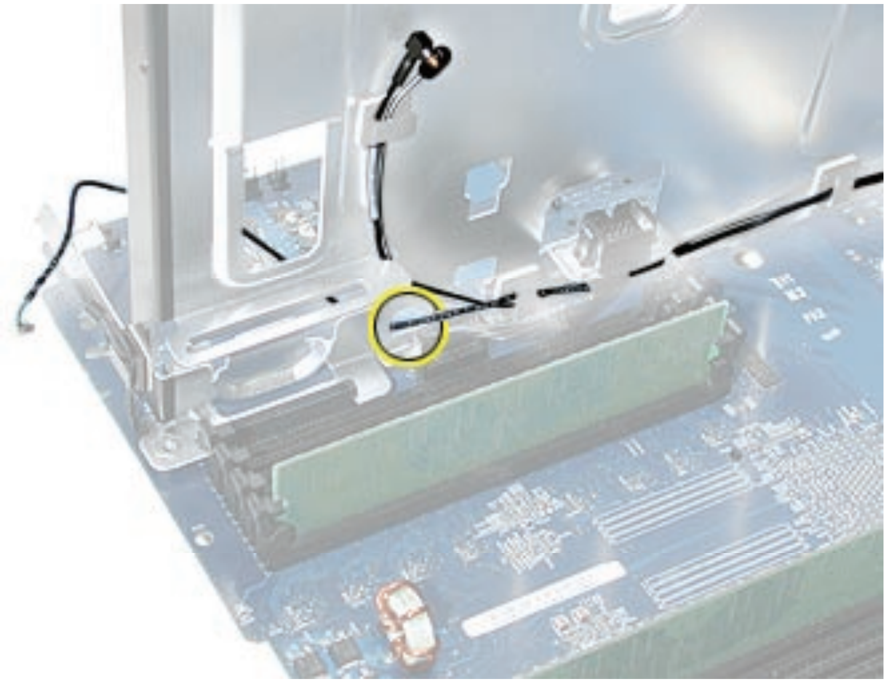
1. Disconnect the front inlet fan cable from the logic board.



2. Remove the thermistor from the cable guide on the end of the PCI divider.

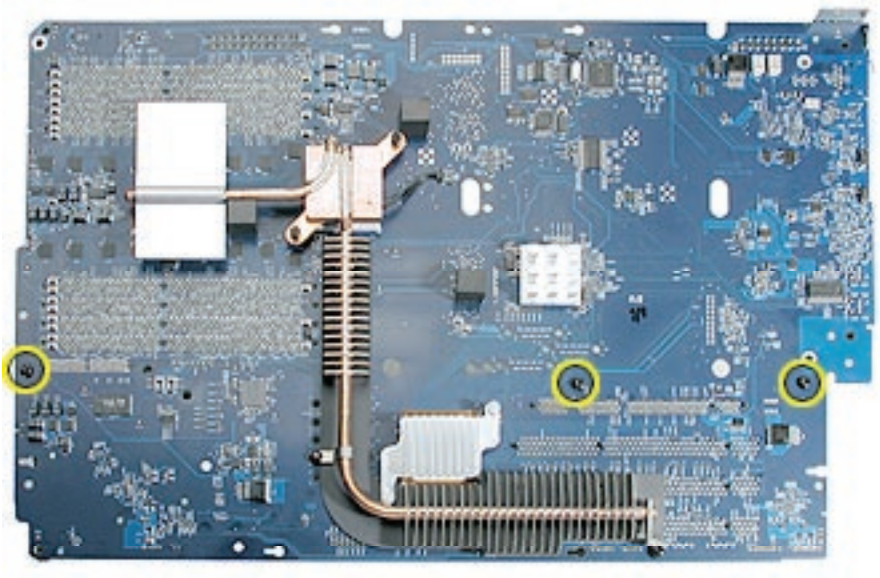


3. Remove the modem filter board cable, Bluetooth cable, and AirPort cable from the cable guides on the PCI divider.

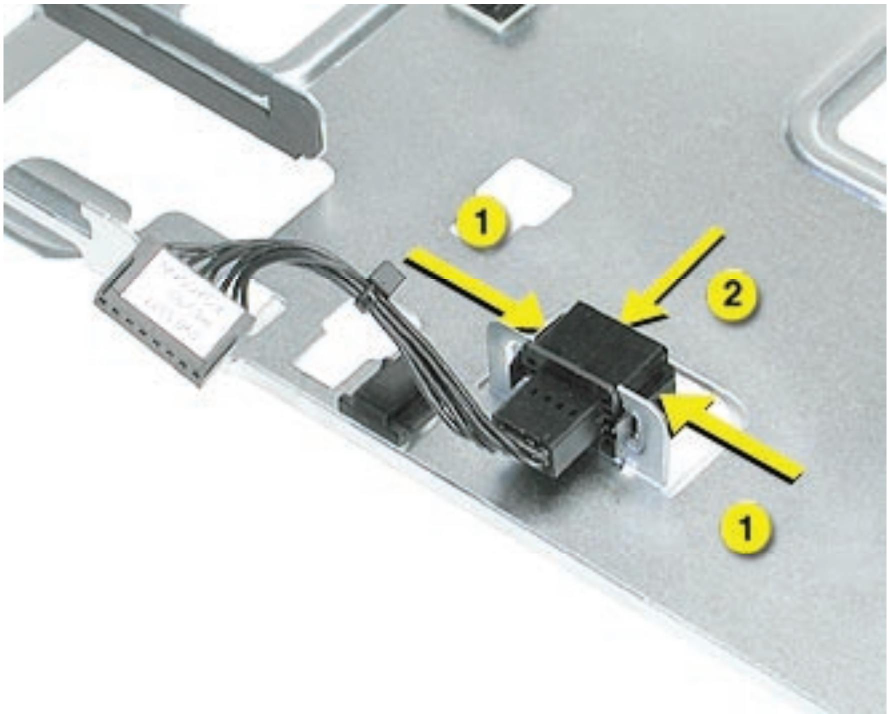


Replacement Note: Be careful when rerouting the two antenna cables that they route under the black connector for the front inlet fan. Make sure that the cables are in place behind all cable guides.

4. Turn the logic board over so that bottom of the board faces up. Remove the three screws that secure the PCI divider, and remove the divider from the logic board.



5. Compress the two latches on the sides of the front inlet fan cable connector, press the connector down through the opening in the PCI divider, and remove the cable from the divider.



PCI Divider: Power Mac G5 (June 2004/Early 2005)

Note: Most Power Mac G5 (June 2004/Early 2005) computers route the antenna board cables and modem filter board cable on the underside of the logic board. However, some Power Mac G5 (June 2004 Dual 1.8 GHz) computers route the antenna board and modem filter board cables on the top of the logic board. If the PCI divider in the Power Mac G5 (June 2004 Dual 1.8 GHz) you are repairing routes the cables on the top of the board, see the previous procedure for "**PCI Divider: Power Mac G5**."

Tools

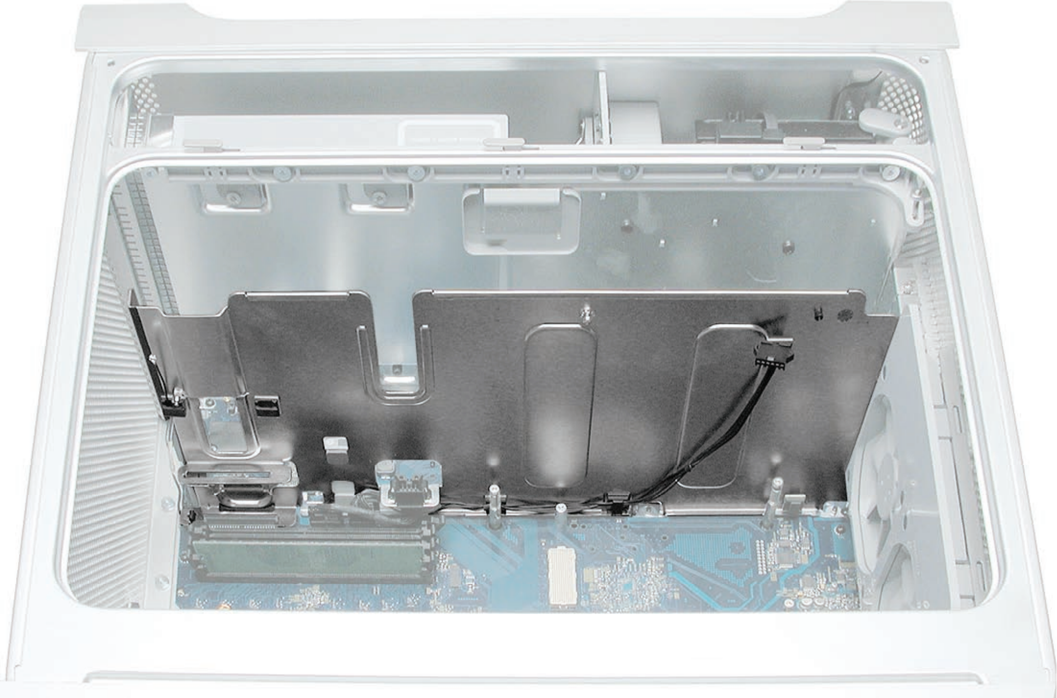
The only tools required for this procedure are a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

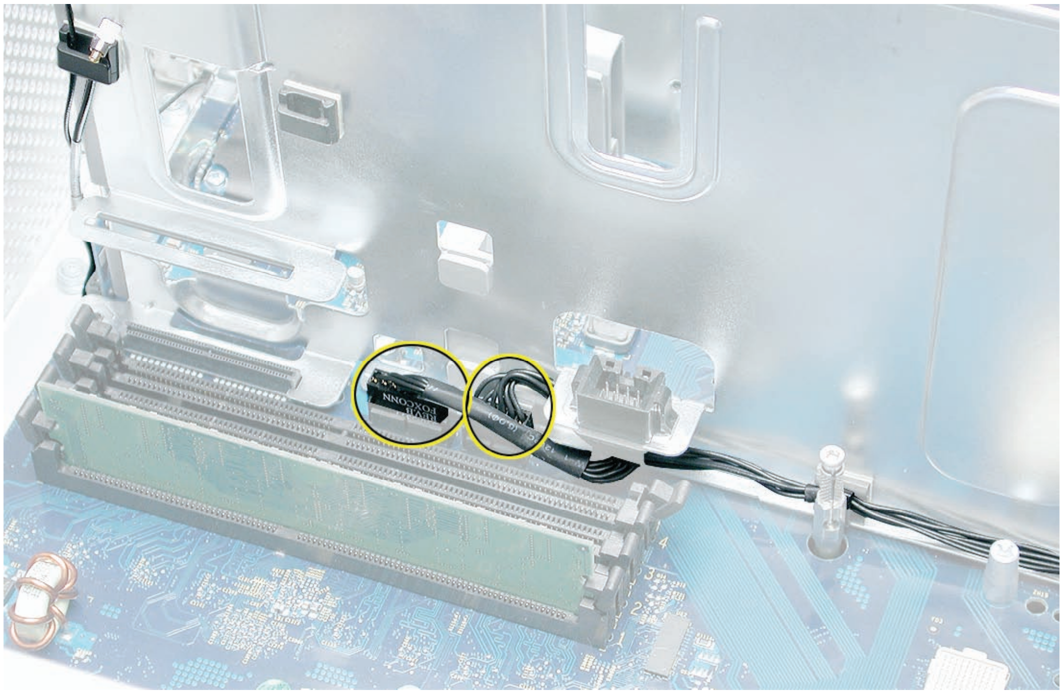
Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

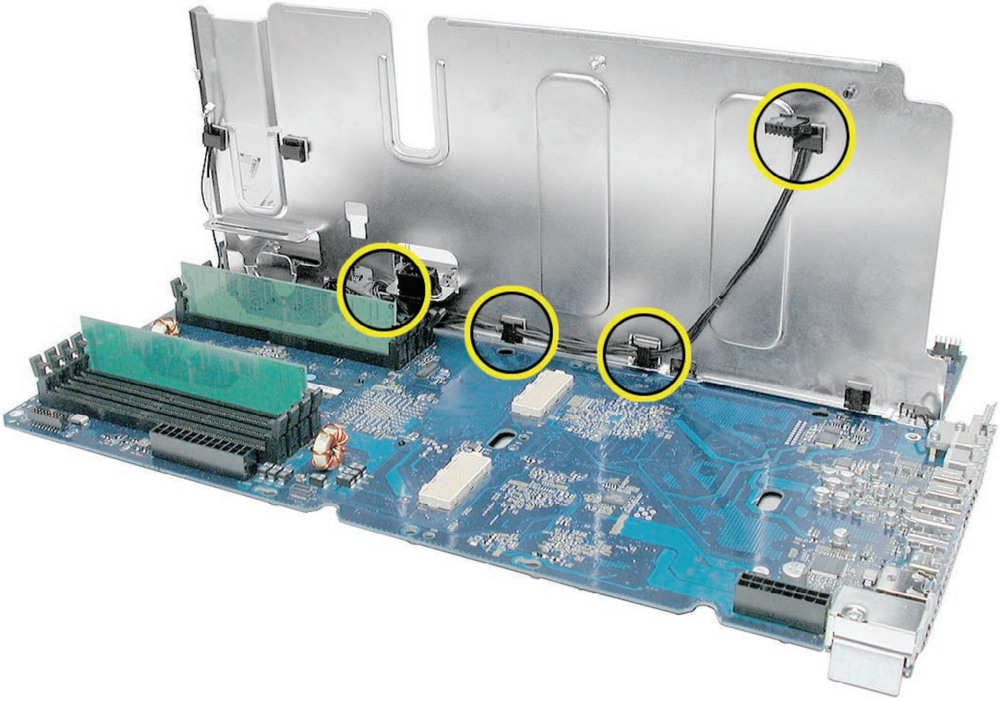
- **Front inlet fan assembly**
- **Heatsink cover(s) for Power Mac G5** or
- **Heatsink cover(s) for Power Mac G5 (June 2004/Early 2005)**
- **Processor(s) for Power Mac G5 without LCS Heatsink** or
- **Processor for Power Mac G5 with LCS Heatsink**
- **All AGP and PCI cards**
- **Rear exhaust fan assembly**
- **PCI card guide**
- **Speaker/fan assembly**
- **AirPort Extreme Card** (if installed)
- **Bluetooth card** (if installed)
- **Front panel board cable**
- **Memory DIMM** if it is in slot next to the power supply cable
- **Power supply for Power Mac G5 without LCS Heatsink** or
- **Power supply for Power Mac G5 with LCS Heatsink**
- **Logic board**

- Logic board



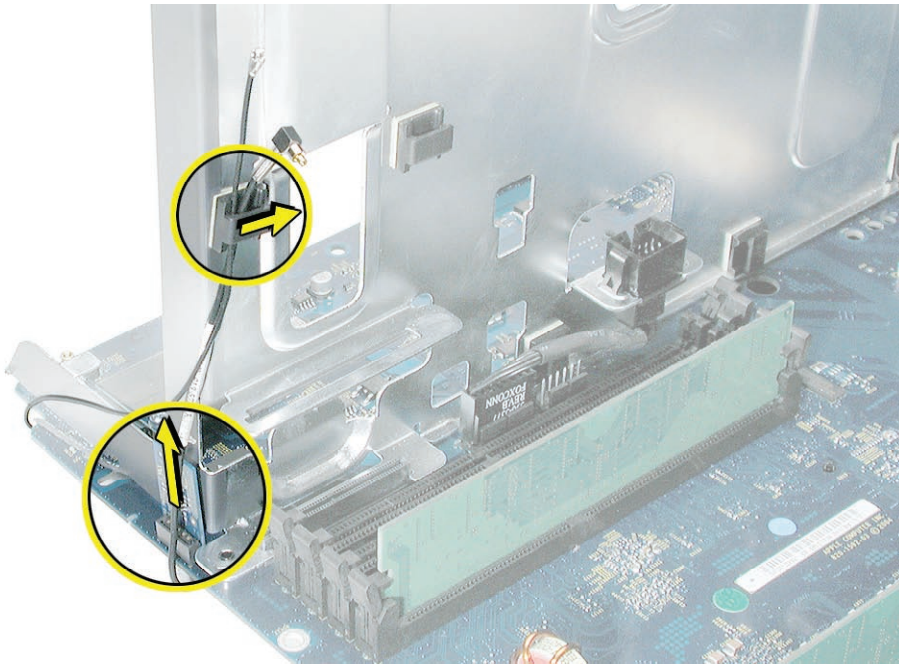
Part Location



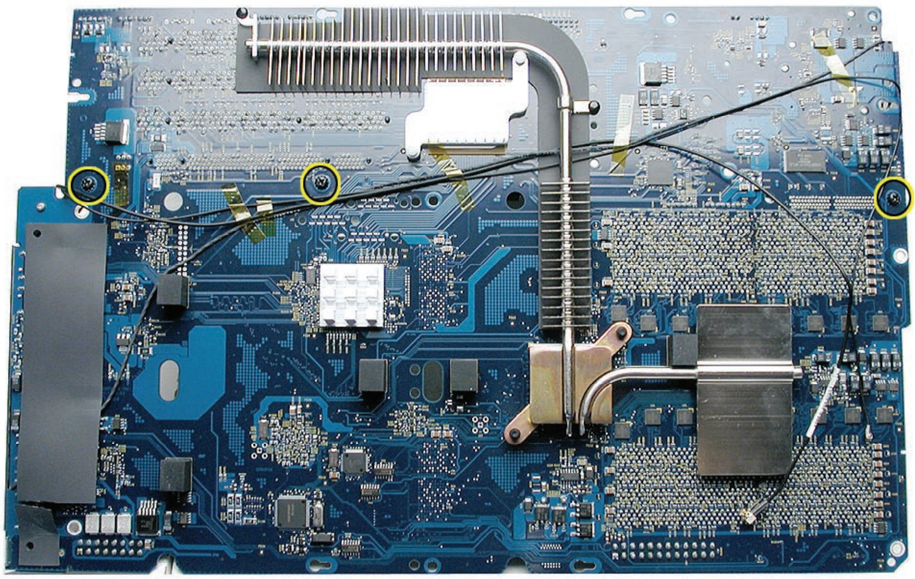


Procedure

1. Disconnect the front inlet fan cable and the heatsink cable from the logic board.

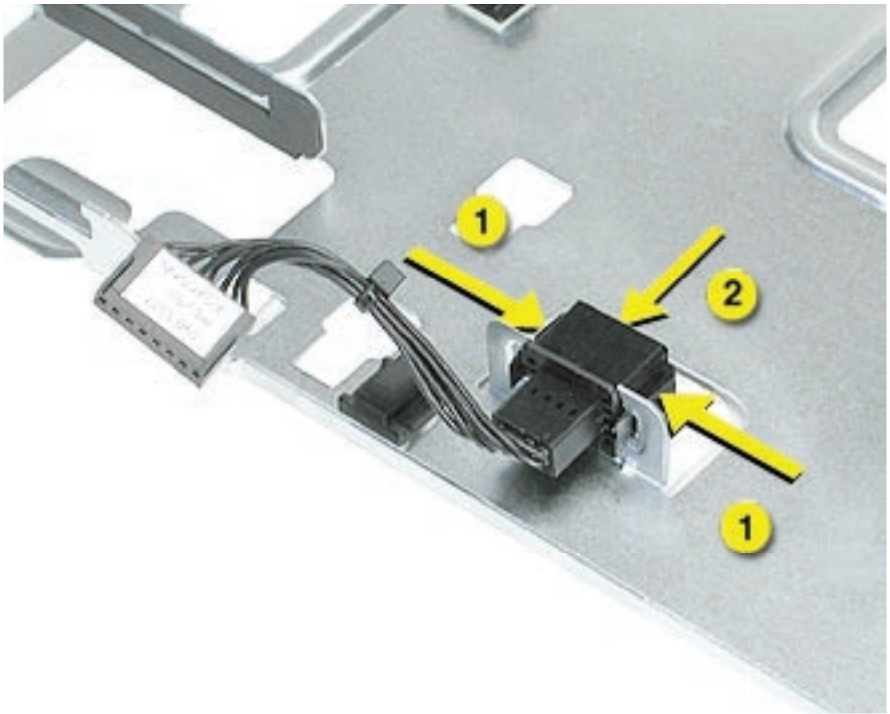


2. **Power Mac G5 (June 2004 Dual 2.5 GHz and Early 2005 Dual 2.7 GHz):** Remove the heatsink cable from the cable guides on the PCI divider.



3. Remove the ambient board (shown below) from the connector on the logic board.

4. Remove the Bluetooth cable and AirPort cable from the cable guides on the PCI divider.



5. Turn the logic board over so that bottom of the board faces up. Remove the three screws that secure the PCI divider, and remove the divider from the logic board.

6. Compress the two latches on the sides of the front inlet fan cable connector, press the connector down through the opening in the PCI divider, and remove the cable from the divider.

Thermistor Cable: Power Mac G5, Power Mac G5 (June 2004 Dual 1.8 GHz)

Tools

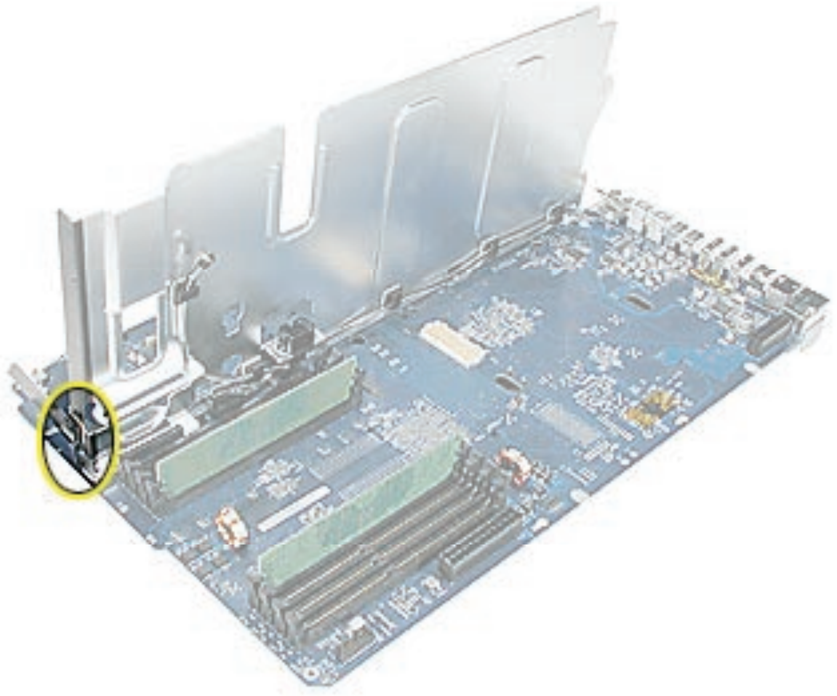
The only tools required for this procedure are a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

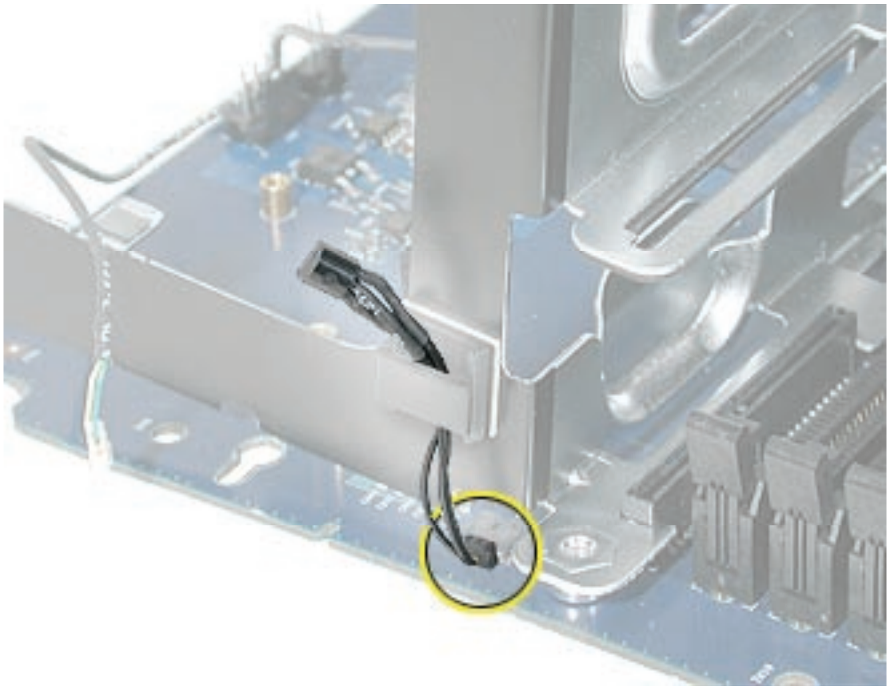
- Front inlet fan assembly
- Heatsink cover(s) for Power Mac G5 or
- Heatsink cover(s) for Power Mac G5 (June 2004/Early 2005)
- Processor(s) for Power Mac G5
- All AGP and PCI cards
- Rear exhaust fan assembly
- PCI card guide
- Speaker/fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply for Power Mac G5
- Logic board for Power Mac G5 or
- Logic board for Power Mac G5 (June 2004/Early 2005)

Part Location



Procedure

1. Disconnect the thermistor cable from the logic board.
2. Remove the thermistor cable from the guide on the PCI divider.



Ambient Board: Power Mac G5 (June 2004 Dual 2.0/2.5 GHz), Power Mac G5 (Early 2005 Dual 2.3/2.7 GHz)

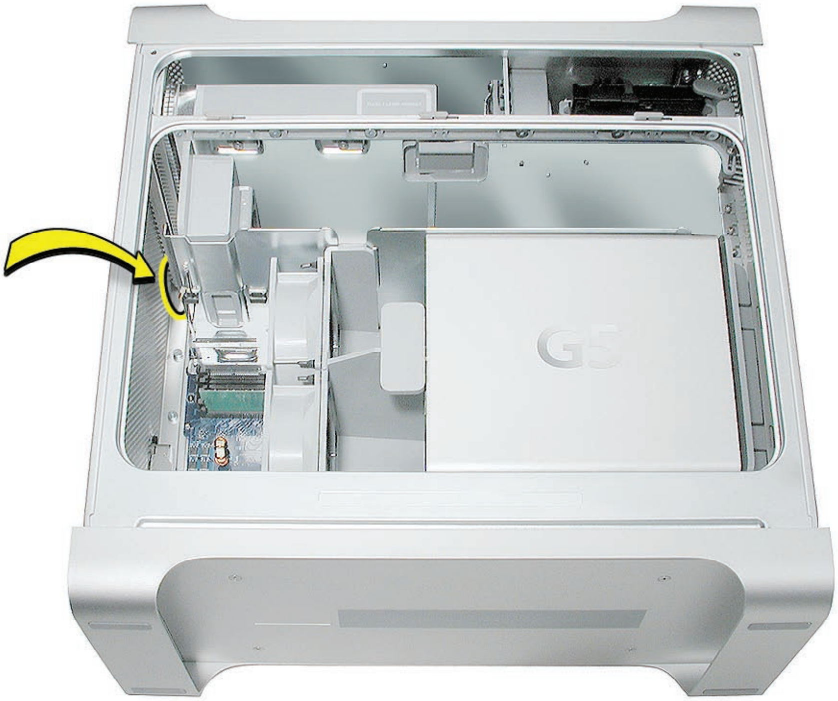
Tools

No tools are required for this procedure.

Preliminary Steps

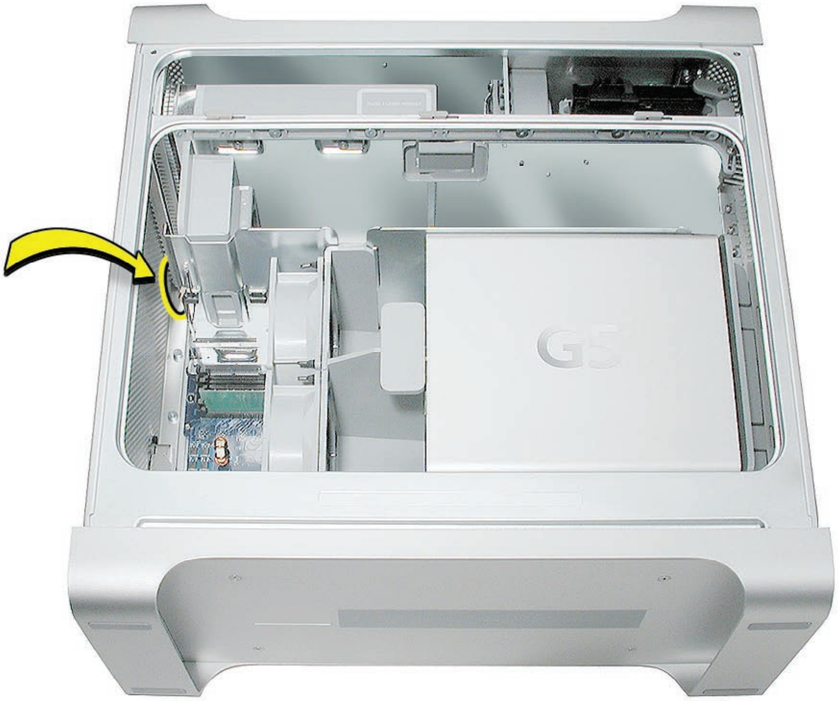
Before you begin, open the computer and lay it on its side with the access side facing up.

Part Location

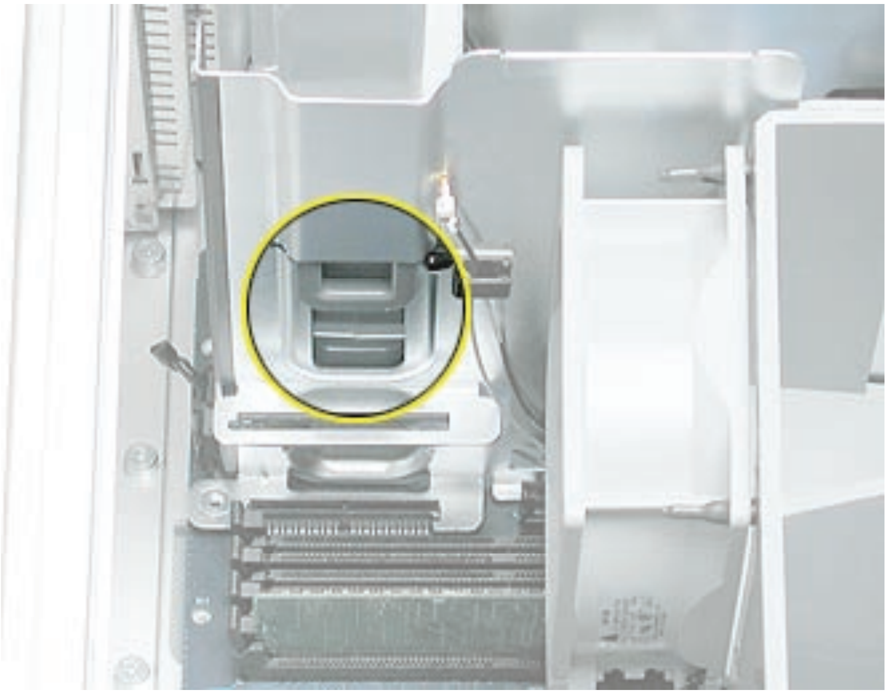


Procedure

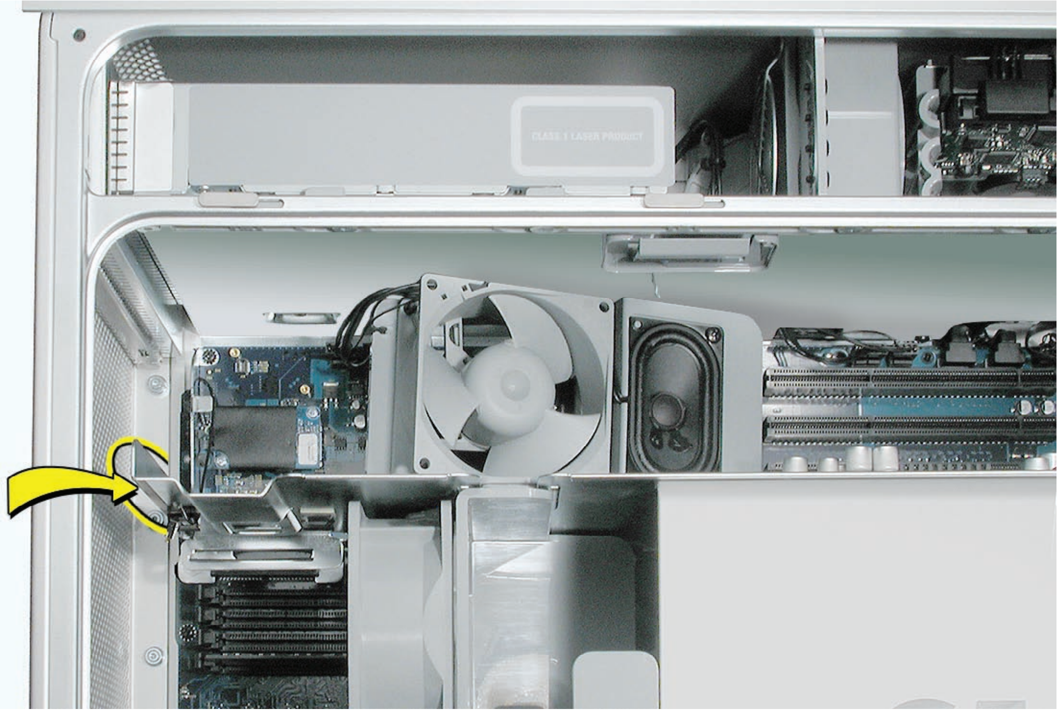
1. Locate the ambient board next to the speaker/fan assembly.



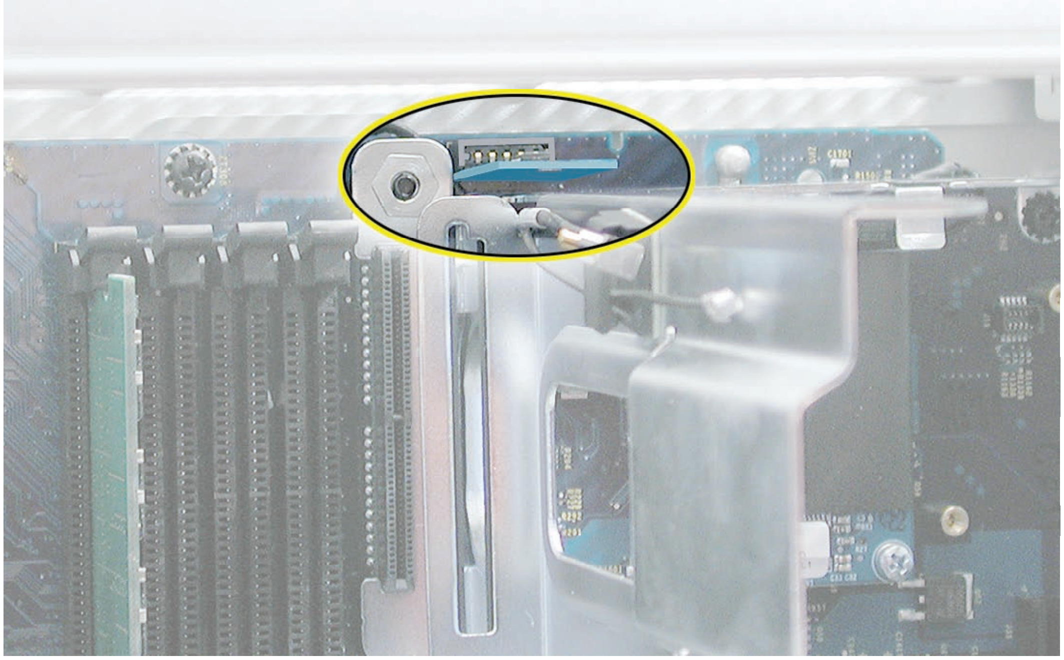
2. Lift the speaker/fan assembly straight up to disengage the large tab (circled) on the side of the bracket from the channel in the sheet metal.



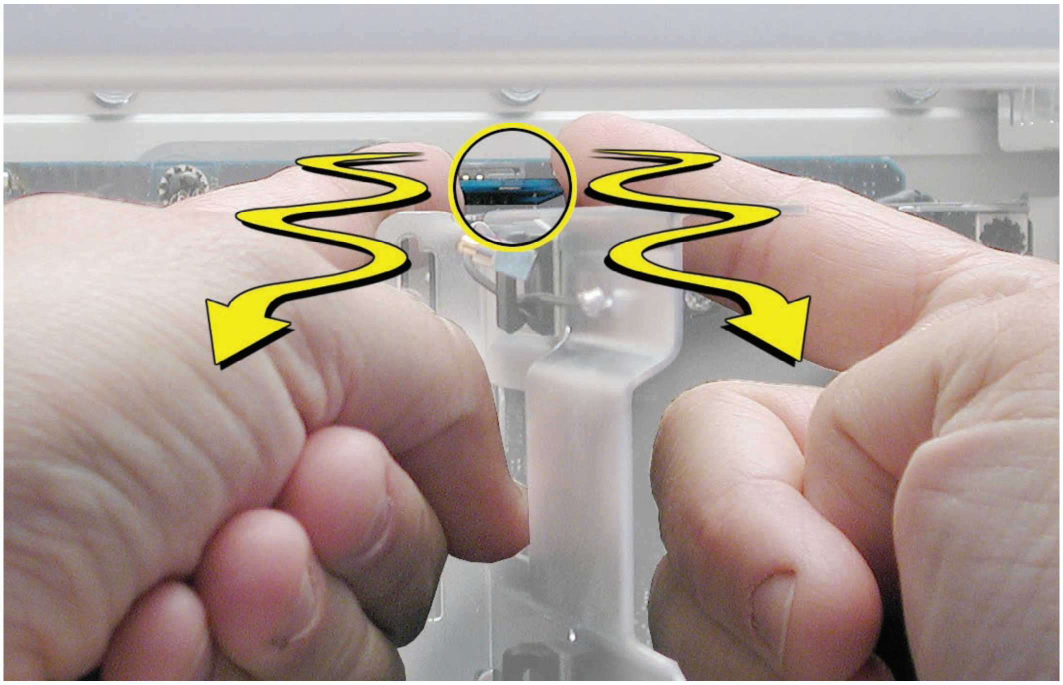
3. Set the speaker/fan assembly off to the side; there is no need to disconnect the assembly.



4. Locate the ambient board connected to the logic board.



5. Position your fingers on both sides of the board. Gently rock the board from side-to-side, pulling it straight up and out of the connector.



Front Inlet Fan Cable

Tools

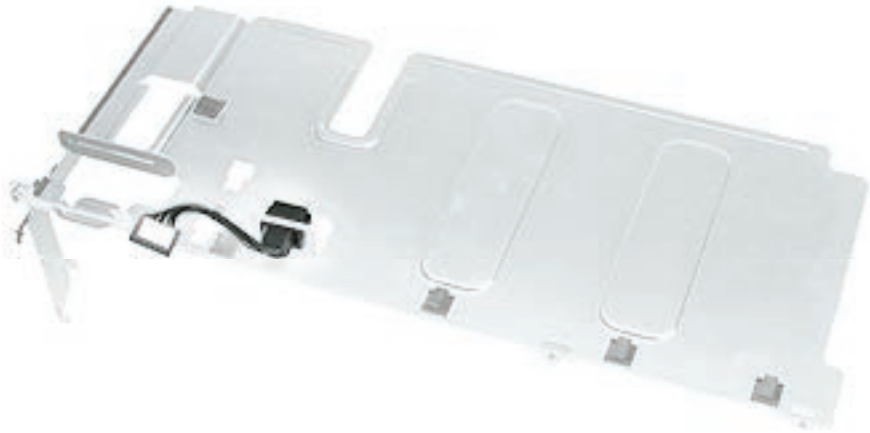
The only tools required for this procedure are a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

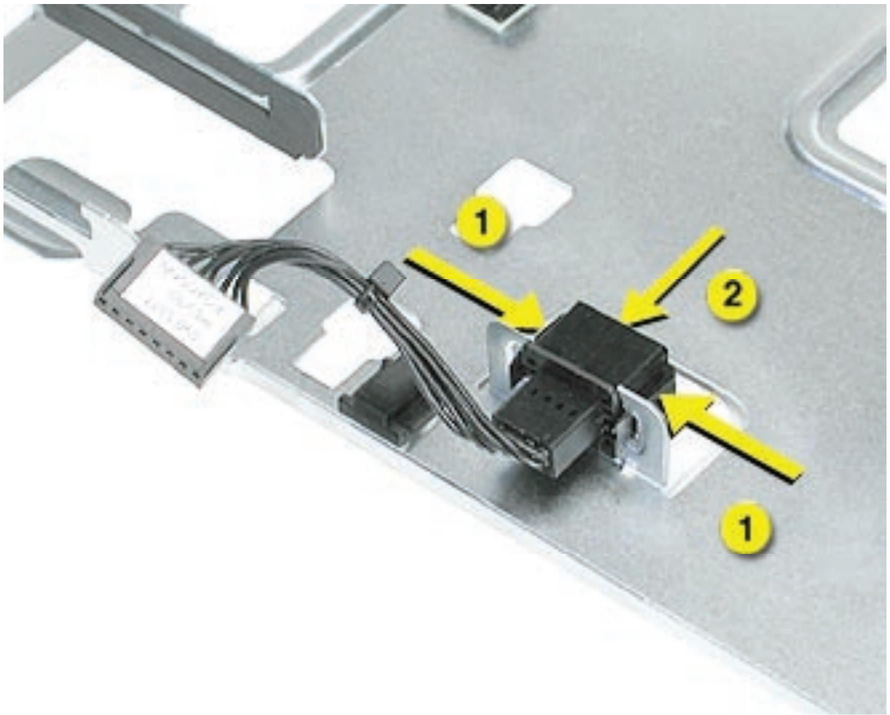
- Front inlet fan assembly
- Heatsink cover(s) for Power Mac G5 or
- Heatsink cover(s) for Power Mac G5 (June 2004/Early 2005)
- Processor(s) for Power Mac G5 without LCS Heatsink or
- Processor for Power Mac G5 with LCS Heatsink
- All AGP and PCI cards
- Rear exhaust fan assembly
- PCI card guide
- Speaker/fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply for Power Mac G5 without LCS Heatsink or
- Power supply for Power Mac G5 with LCS Heatsink
- Logic board for Power Mac G5 or
- Logic board for Power Mac G5 (June 2004/Early 2005)
- PCI divider

Part Location



Procedure

1. Compress the two latches on the sides of the fan cable connector, and press the connector down through the opening in the PCI divider.
2. Remove the cable from the PCI divider.



Front Panel Board

Tools

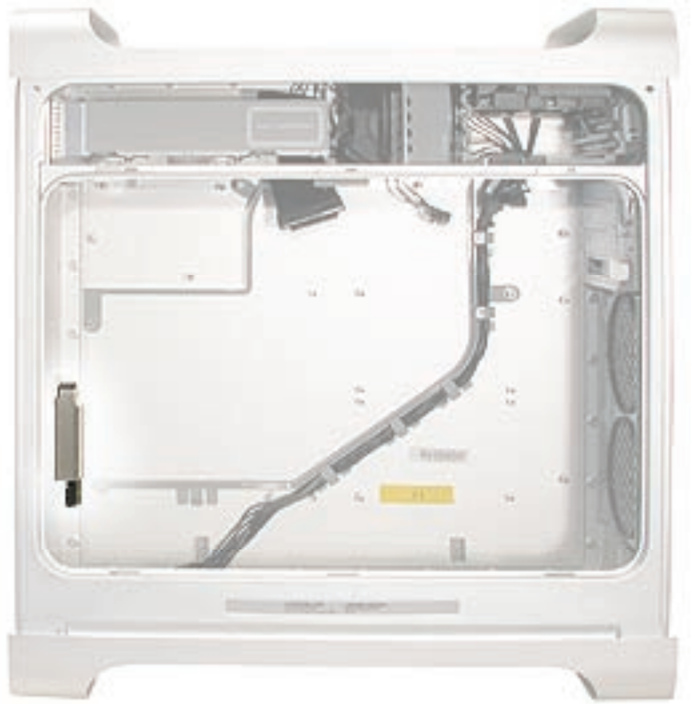
The only tools required for this procedure are a jeweler's flatblade screwdriver, a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

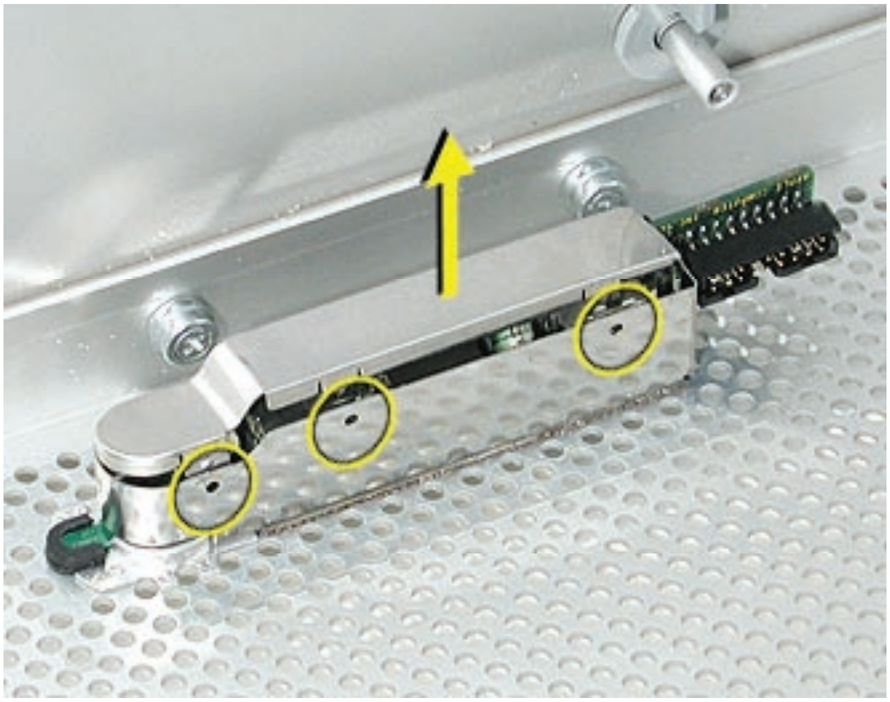
- Front inlet fan assembly
- Heatsink cover(s) for Power Mac G5 or
- Heatsink cover(s) for Power Mac G5 (June 2004/Early 2005)
- Processor(s) for Power Mac G5 without LCS Heatsink or
- Processor for Power Mac G5 with LCS Heatsink
- All AGP and PCI cards
- Rear exhaust fan assembly
- PCI card guide
- Speaker/fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply for Power Mac G5 without LCS Heatsink or
- Power supply for Power Mac G5 with LCS Heatsink
- Logic board for Power Mac G5 or
- Logic board for Power Mac G5 (June 2004/Early 2005)

Part Location

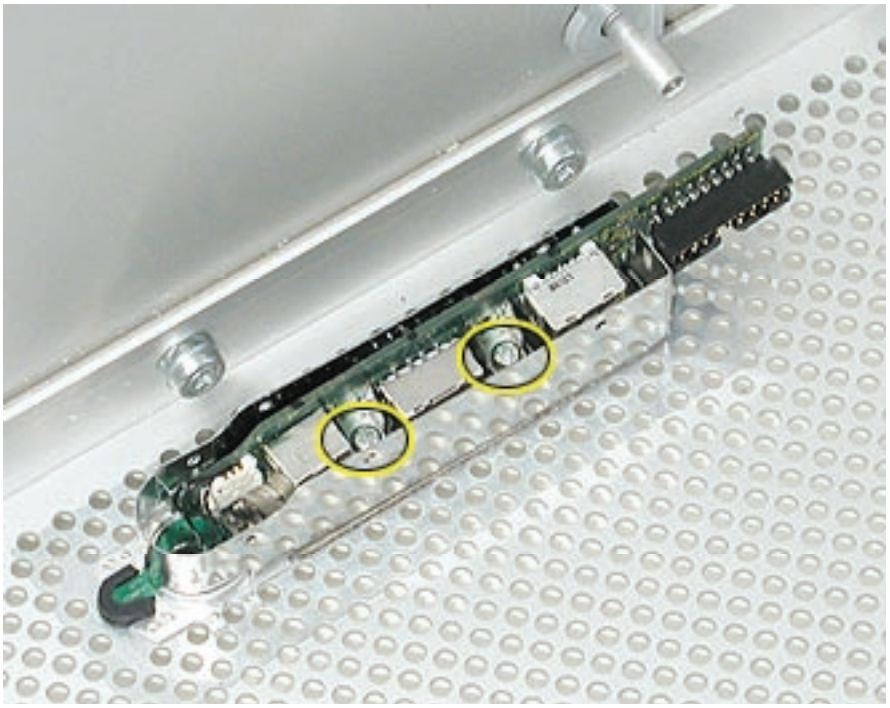


Procedure

1. Using a jeweler's flatblade screwdriver, pry up the metal cap covering the front panel board EMI shield.

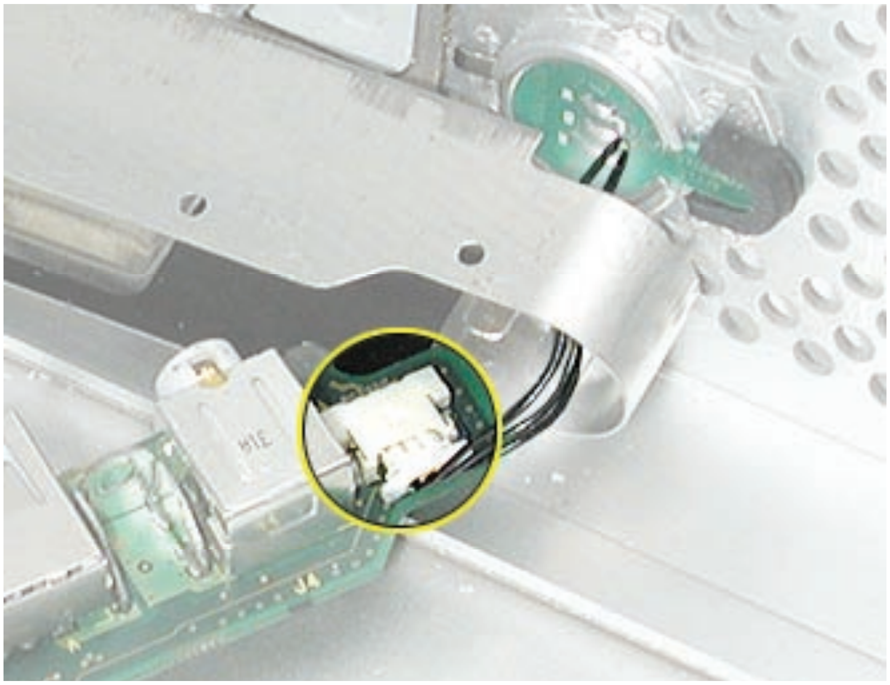


2. Using a Phillips screwdriver, remove the two front panel board mounting screws.



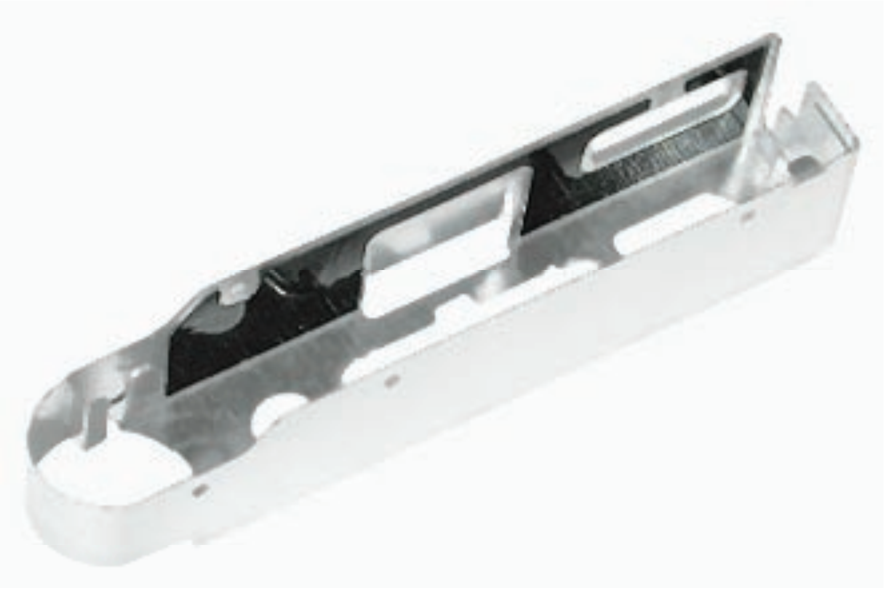
3. Carefully pull the board a short distance out of its EMI shield, and disconnect the power button cable from the board.

4. Remove the board and shield from the enclosure.

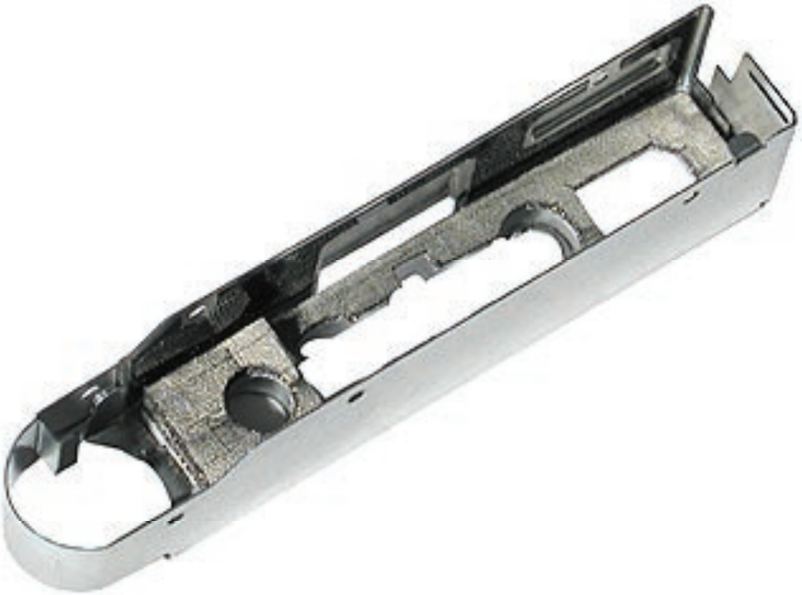


Replacement Procedure

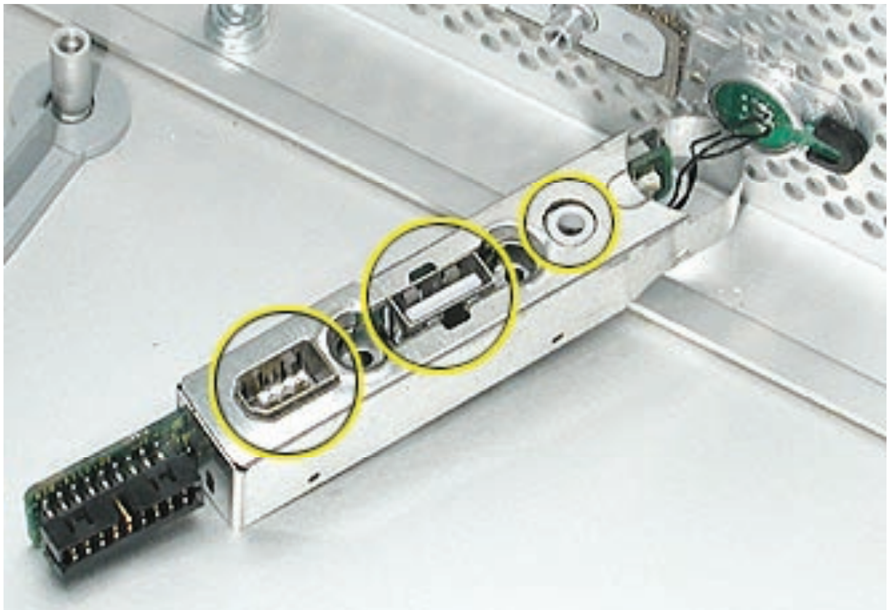
1. If you are replacing the front panel board with a new front panel board, do the following:
   - Peel the backing off the mylar insulation for the EMI shield, and apply the mylar to the side of the shield, as shown.



- Peel the backing off the EMI shield gasket and apply the gasket to the bottom of the shield, making sure the openings in the gasket align with the shield openings.



2. Thread the power button cable through the opening in the EMI shield and connect the cable to the front panel board.
3. Insert the front panel board into the EMI shield, making sure the ports are fully seated in the openings in the shield.



4. Install the front panel board and EMI shield on the inside front of the enclosure and replace the two mounting screws.
5. Install the metal cap on the EMI shield.

Power Button

Tools

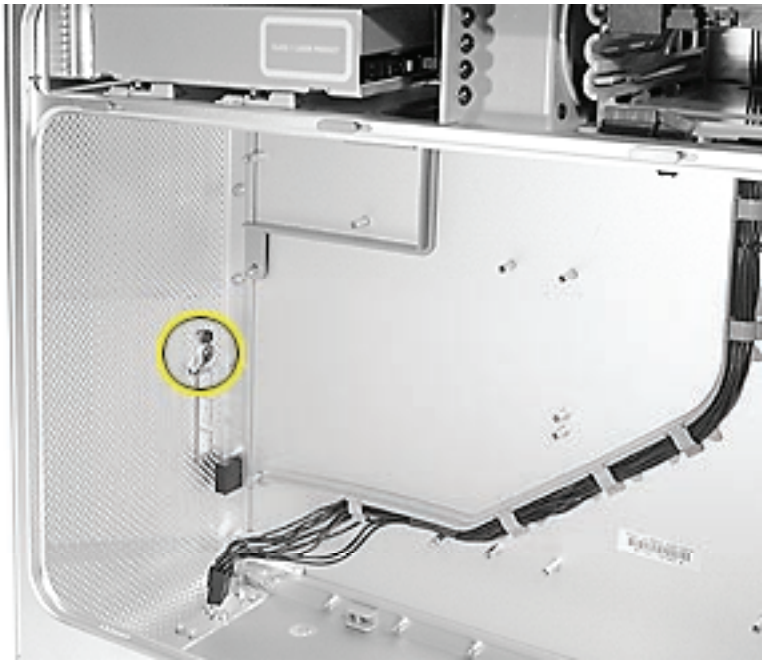
The only tools required for this procedure are a jeweler's flatblade screwdriver, a long-handled Phillips screwdriver, a short-handled Phillips screwdriver, and a hex wrench.

Preliminary Steps

Before you begin, open the computer, lay it on its side with the access side facing up, and remove the following:

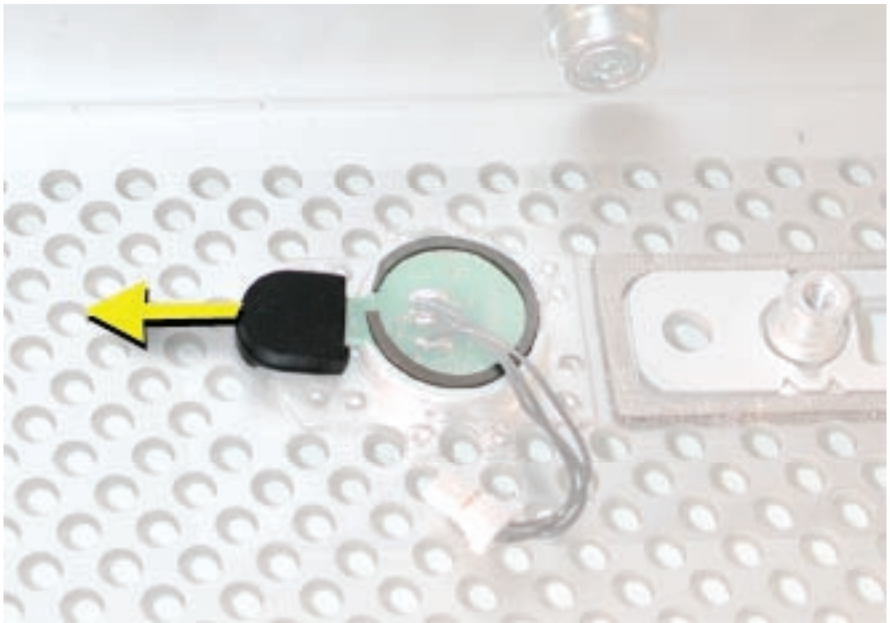
- Front inlet fan assembly
- Heatsink cover(s) for Power Mac G5 or
- Heatsink cover(s) for Power Mac G5 (June 2004/Early 2005)
- Processor(s) for Power Mac G5 without LCS Heatsink or
- Processor for Power Mac G5 with LCS Heatsink
- All AGP and PCI cards
- Rear exhaust fan assembly
- PCI card guide
- Speaker/fan assembly
- Front panel board cable
- Memory DIMM if it is in slot next to the power supply cable
- Power supply for Power Mac G5 without LCS Heatsink or
- Power supply for Power Mac G5 with LCS Heatsink
- Logic board for Power Mac G5 or
- Logic board for Power Mac G5 (June 2004/Early 2005)
- Front panel board

Part Location

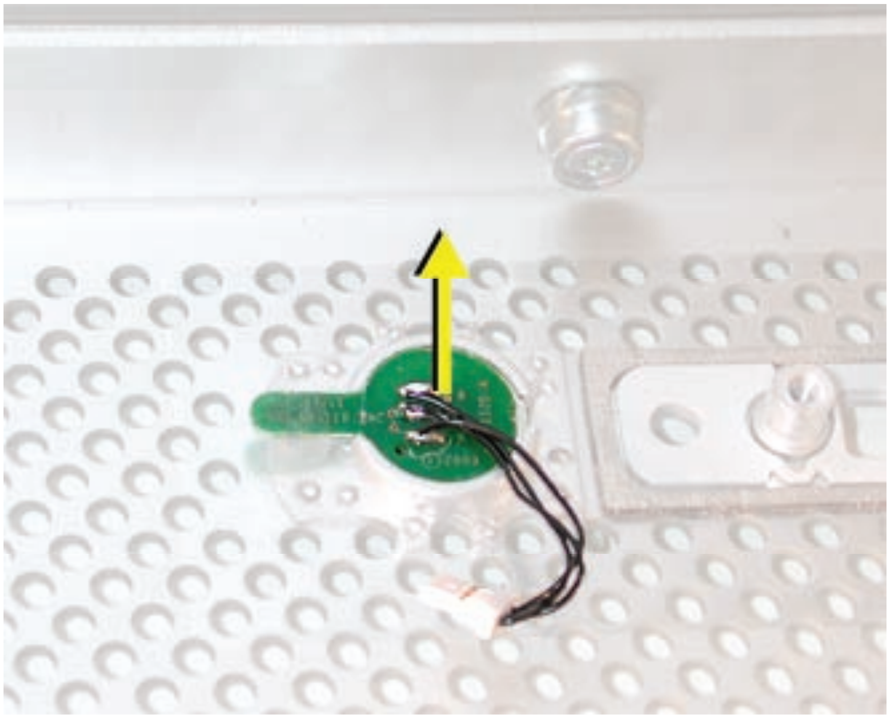


Procedure

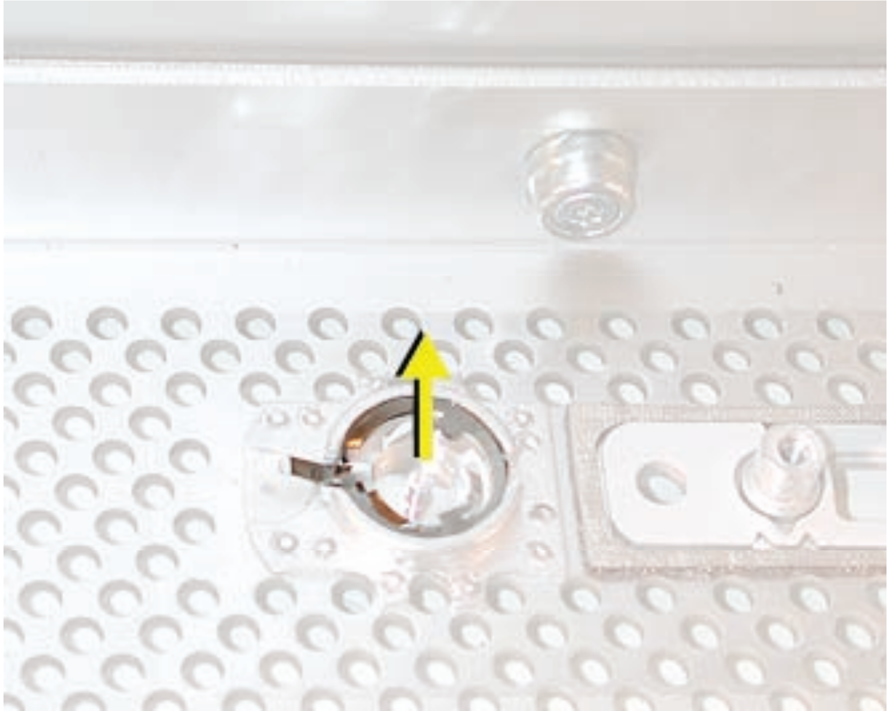
1. Lay the computer so that the front panel is facing down.
2. Remove the black rubber cap that covers the power button LED.
3. Using a flatblade jeweler's screwdriver, pry up the metal C-ring that secures the power button board.



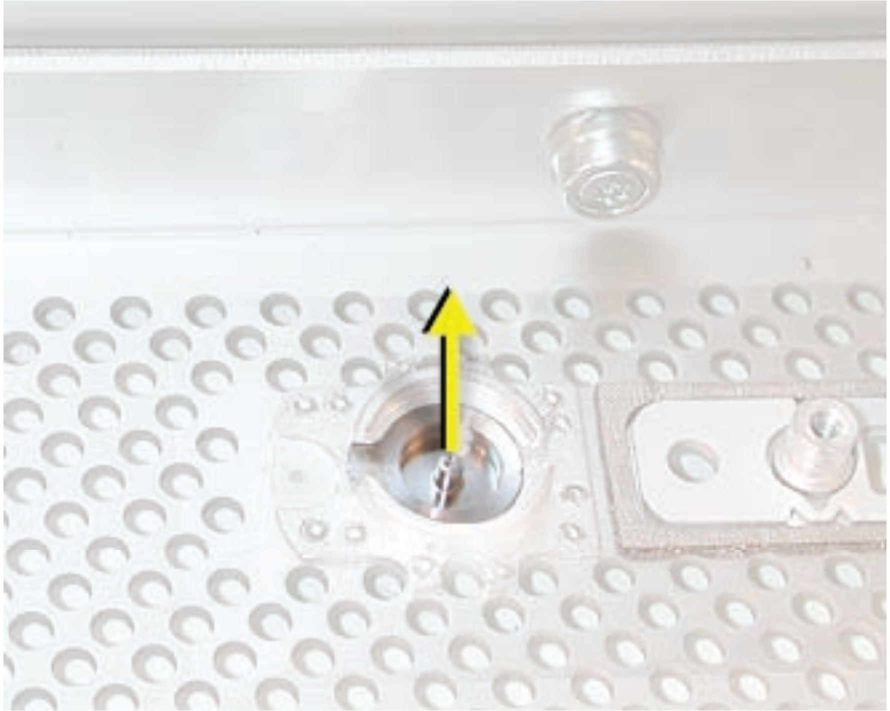
4. Lift up and remove the power button board.



5. Remove the metal activation ring that lies below the power button board.



6. Remove the power button from the enclosure.



Service Source

Troubleshooting

Power Mac G5

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General Information

Liquid Cooling System (LCS)

The Power Mac G5 (June 2004 Dual 2.5 GHz/Early 2005 Dual 2.7 GHz) configurations use a liquid cooling system (LCS) to manage the temperature in the computer. The liquid cooling system is sealed and is designed to be opened only by an Apple Authorized Service Provider (AASP).

To ensure proper safety and handling of the LCS system, please read the following information.

General Safety Information

The LCS cooling system fluid is predominantly water (80% or greater) with a mixture of corrosion inhibitors, antifreeze, and bacterial growth preventatives. In normal use in a non-leaking LCS there are no special handling considerations. However, if a leak in the system is suspected or discovered and the computer is plugged in, remove power to the computer by pulling power plug.

Nitrile or rubber glove should be worn when handling an LCS module that is leaking or suspected to be leaking. Evidence of leaks would include corrosion around fittings in the LCS coolant system, a light green or red liquid present, or a slick or slimy feel when handling the part. For leaks or spills, wipe up the fluid using rags, paper towels, or other suitable materials. Dispose of all cleaning materials according to local laws and regulations (Refer to laws and regulations pertaining to disposal of Antifreeze). Do not combine used coolant with any other chemical.

Place the failed LCS module (leaking or not) in the packaging that the replacement module came in. Follow the packaging instructions included with the replacement module. Failure to follow the instructions could damage your equipment and void warranty coverage.

Safety Guidelines

Below is a summary of first aid measures for exposure to the liquid. For complete instructions refer to the Material Safety Data Sheets (MSDS) for the liquid. The Safety Data Sheets can be found at http://www.apple.com/environment/resources/msds.html.

> **Eyes:** Immediately flush with plenty of water. If wearing contact lenses, after initial flushing, remove contact lenses and continue to flush for 15 minutes. Have eyes examined by a medical professional if irritation persists.

Skin: Wash skin with running water. Remove contaminated clothing. The recommended flushing is 15 minutes if pain or irritation occurs. Seek medical attention if irritation or redness develops.

Ingestion: Ingestion of this product, while unlikely to occur in its containment, may cause irritation of the mouth and throat, gastric upset, stomach ache, cramps, nausea and vomiting. If the product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Contaminated individuals should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

DDR Memory

In the Power Mac G5, DIMMs must be installed in pairs of equal size and speed. Use PC2700 DDR-SDRAM for 4-DIMM-slot computers and PC3200 DDR-SDRAM for 8-DIMM-slot computers. Memory from older Macintosh computers is not compatible. Do not try to install non-DDR memory as it will not fit in the DIMM slots and could cause damage.

Important: Power Mac G5 (June 2004/Early 2005) computers support only 184-pin, 2.5 volt, DDR400-compliant (PC3200) DRAM DIMMs with a maximum of 4 GB or 8 GB depending on the configuration.

Results of Mixing PC2100, PC2700, and PC3200 RAM

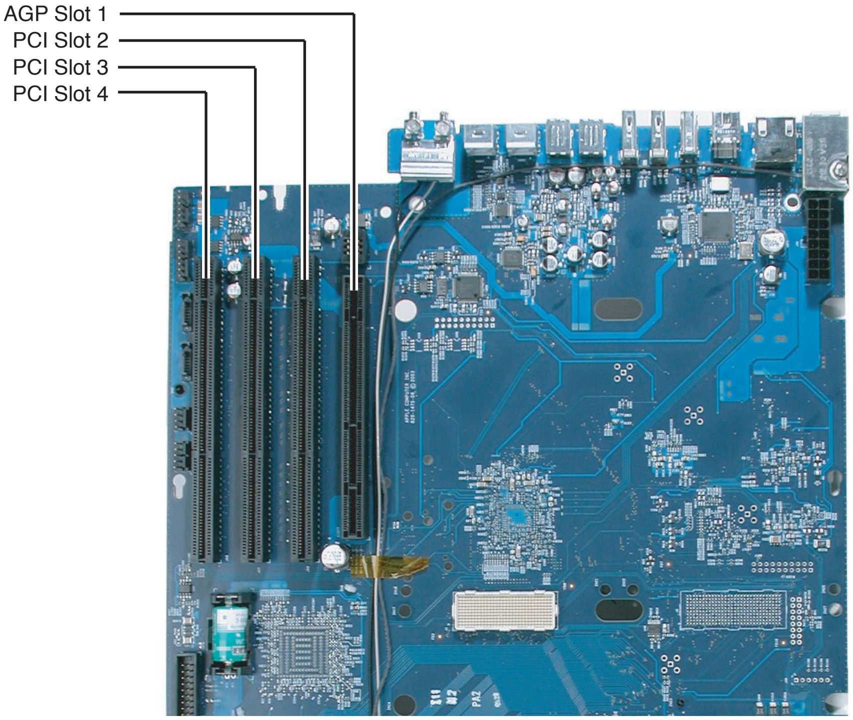
The table below describes what happens if you install PC2100, PC2700, or PC3200 memory in either a 4-DIMM-slot or 8-DIMM-slot Power Mac G5 computer.

Four-DIMM-Slot Systems	
When only PC2100 DIMMs are installed	The computer makes three single tones instead of the startup sound. The LED on the front of the computer flashes three times, and the computer does not startup.
When a mix of PC2100, PC2700, or PC 3200 DIMMs is installed	The computer starts up normally, but neither the computer nor Apple System Profiler recognizes the PC2100 memory.
When only PC3200 DIMMs are installed in the slots	The computer starts up normally and behaves as though PC2700 DIMMs are installed.
When no memory is installed or memory is not installed correctly	The computer does not make a normal startup sound. Instead, there is a single tone, and the computer’s front LED flashes about once every 5 seconds.

Eight-DIMM-Slot Systems	
When only PC2100 DIMMs are installed	The computer makes three single tones instead of the startup sound. The LED on the front of the computer flashes three times, and the computer does not startup.
When a mix of PC2100, PC2700, or PC 3200 DIMMs is installed	The computer starts up normally, but neither the computer nor Apple System Profiler recognizes the PC2100 memory.
When no memory is installed or memory is not installed correctly	The computer does not make a normal startup sound. Instead, there is a single tone, and the computer's front LED flashes about once every 5 seconds.

PCI and AGP Cards

The Power Mac G5 computer has four expansion card slots, three of which accommodate Peripheral Component Interconnect (PCI) cards and one that accepts an advanced graphics port (AGP) video card. AGP cards and PCI cards have different connectors, so you cannot insert a PCI card into the AGP slot.



Note: Maximum power consumption for all four expansion slots (the three PCI expansion cards and the AGP card) should not exceed 90 watts (W).

AGP Cards

The AGP video card, installed in slot 1, contains the graphics processor unit (GPU) and provides the computer's display ports. Slot 1 is designed specifically to accept AGP cards.

Note: When certain high-end video cards are installed in the AGP slot, they block the adjacent PCI/PCI-X slot (slot 2). As a result, you can install PCI/PCI-X cards in slots 3 and 4 but not in slot 2. For specific card information, see the video card table in the "**Video**" topic in the Basics chapter.

The Power Mac G5 (June 2004/Early 2005) models have the accelerated graphics port (AGP 8x Pro) bus. It's an enhanced PCI bus with extra functionality to burst texture data and graphics across the port up to 8 times faster than a 66 MHz PCI port. The computer comes with a graphics card installed in the AGP 8x Pro slot and has either an ADC and DVI-I connector or dual DVI-I connectors. (See the "**Video**" topic in the Basics chapter.) The AGP bus is 1.5 V only and is not backward compatible. Older AGP cards will not work in these models.

PCI Cards

The remaining three expansion slots, labeled 2, 3, and 4, accommodate PCI cards up to 12 inches long. Depending on the Power Mac G5 model, you can install either PCI or PCI-X cards.

Note: To determine if a Power Mac G5 computer can accommodate PCI-X cards, check the number of DIMM slots on the logic board. Computers with four DIMM slots have 33 MHz PCI slots and can't use PCI-X cards; computers with eight DIMM slots can accommodate 100 and 133 MHz PCI-X cards. See the chart below.

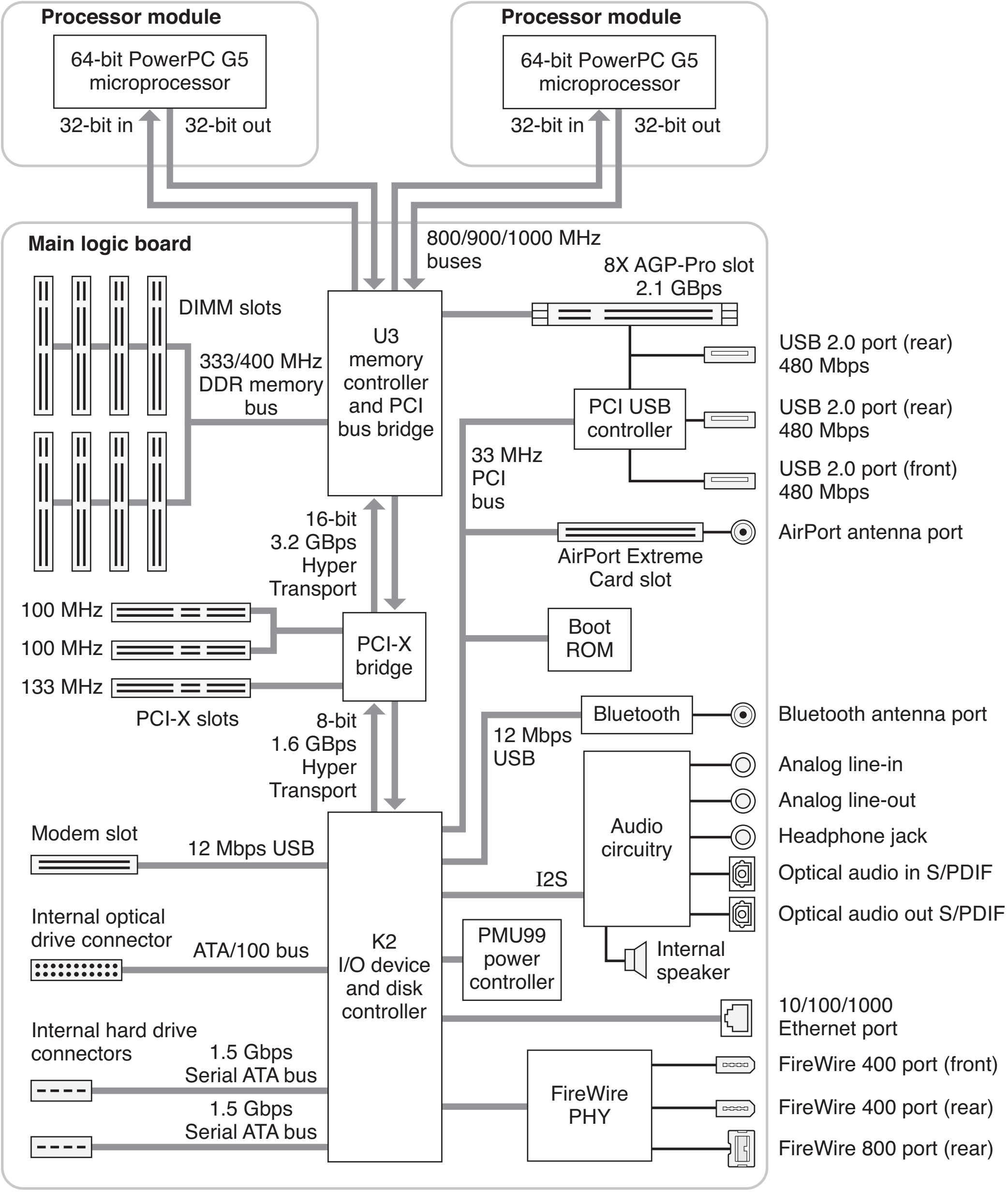
Card type	PCI slot	Card speed
PCI*	slots 2, 3, and 4	64-bit, 33 MHz
PCI-X	slots 2 and 3	64-bit, 100 MHz
PCI-X	slot 4	64-bit, 133 MHz

*The PCI slots can accommodate mixed-voltage (5.0 V, 12 V, or 3.3 V) cards but only at 3.3 V signaling, with 32-bit or 64-bit data widths and a 33 MHz frequency. You can add a 66 MHz card to a 33 MHz PCI slot if the card can operate at the lower 33 MHz rate.

Warning: Installing a PCI card that functions only at 66 MHz in a 33 MHz slot could damage the computer. However, cards that run at both 66 MHz and 33 MHz may be installed. Check with the card's manufacturer to see if a 66 MHz card also works at 33 MHz.

Block Diagram

The architecture of the Power Mac G5 computer is based on the PowerPC G5 microprocessor and two custom ICs: the U3 memory controller/bus bridge and the K2 I/O controller.


Processor module
64-bit PowerPC G5 microprocessor
32-bit in
32-bit out
Processor module
64-bit PowerPC G5 microprocessor
32-bit in
32-bit out
Main logic board
800/900/1000 MHz buses
8X AGP-Pro slot 2.1 GBps
DIMM slots
333/400 MHz DDR memory bus
U3 memory controller and PCI bus bridge
USB 2.0 port (rear) 480 Mbps
PCI USB controller
USB 2.0 port (rear) 480 Mbps
33 MHz PCI bus
USB 2.0 port (front) 480 Mbps
AirPort antenna port
AirPort Extreme Card slot
16-bit 3.2 GBps Hyper Transport
100 MHz
100 MHz
133 MHz
PCI-X bridge
Boot ROM
PCI-X slots
8-bit 1.6 GBps Hyper Transport
Bluetooth
Bluetooth antenna port
12 Mbps USB
Analog line-in
Analog line-out
Headphone jack
Optical audio in S/PDIF
Optical audio out S/PDIF
Modem slot
12 Mbps USB
Audio circuitry
I2S
Internal optical drive connector
ATA/100 bus
K2 I/O device and disk controller
PMU99 power controller
Internal speaker
10/100/1000 Ethernet port
Internal hard drive connectors
1.5 Gbps Serial ATA bus
1.5 Gbps Serial ATA bus
FireWire PHY
FireWire 400 port (front)
FireWire 400 port (rear)
FireWire 800 port (rear)

Thermal Calibration

To ensure proper fan and temperature control in the Power Mac G5, you must run Apple Service Diagnostic whenever you replace a processor or logic board with a new processor or logic board. You must also run the diagnostic if you re-install the same processor but in a different connector from the one in which it was originally installed. Apple Service Diagnostic for Power Mac G5 is available as a download from **http://www.info.apple.com/discimages/**.

Note: The calibration process of Apple Service Diagnostic requires a controlled environment to ensure accurate ambient temperature readings. Computers under test must have the transparent air deflector installed and the door sensor switch must be operable. Units under test should also be located away from heating and air conditioning ventilation systems and the fan exhaust of other machines. Ambient temperature should not go above 77 degrees Fahrenheit or 25 degrees Centigrade.

Resetting the PMU on the Logic Board

The PMU (Power Management Unit) is a microcontroller chip that controls all power functions for this computer. The PMU is a computer within a computer. Its function is to:

- tell the computer to turn on, turn off, sleep, wake, idle, etc.
- manage system resets from various commands.
- maintain parameter RAM (PRAM).
- manage the real-time clock.

Important: Be very careful when handling the logic board. The PMU is very sensitive and touching the circuitry on the logic board can cause the PMU to crash. If the PMU crashes and is not reset, the battery life goes from about five years to about two days.

Note: For the location of the PMU reset button, see "**Logic Board Diagram**" in the Views chapter.

Many system problems can be resolved by resetting the PMU chip. When you have a computer that fails to power up, follow this procedure before replacing any modules:

1. Disconnect the power cord and check the battery in the battery holder. The battery should read 3.3 to 3.7 volts. If the battery is bad, replace it, wait ten seconds, and then proceed to step 2. If the battery is good, go directly to step 2.
2. Press the PMU reset button once and then proceed to step 3. Do not press the PMU reset button a second time because it could crash the PMU chip.
3. Wait ten seconds before connecting the power cord and powering on the computer. If the computer does not power on, there is something else wrong with it; refer to the "**Startup Failures**" section of "Symptom Charts" in this chapter.

Note: The above procedure resets the computer's PRAM. After resetting the PMU, be sure to reset the time, date, and other system parameter settings.

Power-On Self Test: RAM and Processor Verification

A power-on self test in the computer's ROM automatically runs whenever the computer is started up after being fully shut down (the test does not run if the computer is only restarted). If the test detects a problem, the status LED located above the power button on the front of the computer will flash in the following ways*:

- 1 Flash: No RAM is installed or detected.
- 2 Flashes: Incompatible RAM types are installed.
- 3 Flashes: No RAM banks passed memory testing.
- 4 Flashes: No good boot images are detected in the boot ROM (and/or there is a bad sys config block).
- 5 Flashes: The processor is not usable.

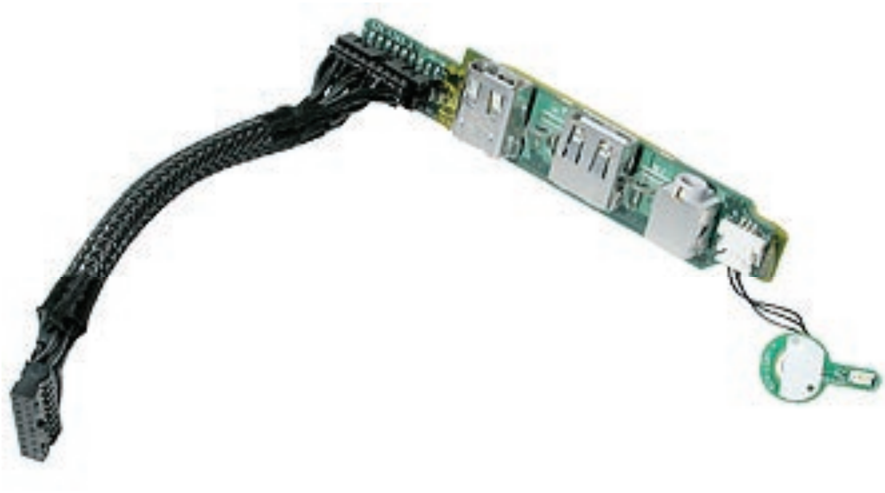
* **Note:** The status LED lights up when the power button is depressed at startup. Do not count this light as one of the diagnostic flashes.

Front Panel Board Troubleshooting

Certain no power symptoms can sometimes be caused by a failed front panel board or power button. However, troubleshooting these parts by swapping them out with known-good parts can be time-consuming. An alternative approach is to build a simple front panel board troubleshooting tool, as illustrated, and then use the procedures described below to test the board and button before actually replacing them.

The tool consists of a known-good front panel board, with a known-good power button and front panel board cable attached.

To use the tool in troubleshooting the front panel board and power button, do the following:



1. Shut down the computer.
2. Disconnect the installed front panel board cable from the logic board.
3. Connect the front panel board cable from the troubleshooting tool to the logic board.
4. Try to start up the computer by pressing the power button on the troubleshooting tool.

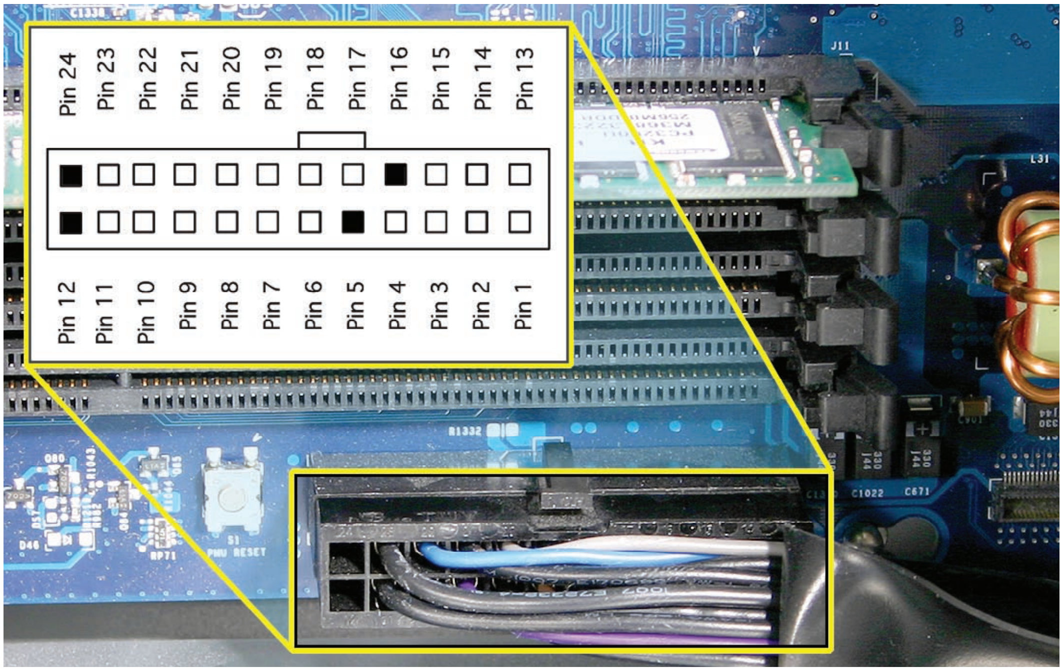
Then proceed with the front panel board troubleshooting steps as described in the "**Symptom Charts**" in this chapter.

Power Supply Verification

To power on, the computer's logic board requires a "trickle" power of +5V. If the system fails to power on, first reset the PMU. Then follow the procedure outlined below to determine whether the problem is related to the power supply.

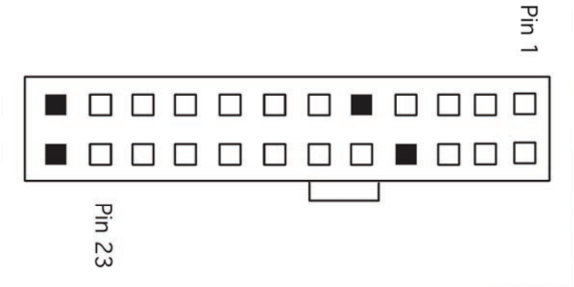
Note: To verify the power supply, you need a volt meter.

1. Remove the power cord from the computer.
2. Open the computer, lay it on its side with the access side facing up.
3. Remove the front inlet fan assembly.
4. Remove the black plastic cap covering the 24-pin power supply cable connector (the P1 or largest connector). The cap fits tightly over the connector. To remove it, rock the cap gently forward and backward as you lift up.
   Note: This is a top view of the connector when it is plugged into the logic board.
5. Press the release latch on the connector and disconnect the cable from the logic board.


Pin 24
Pin 23
Pin 22
Pin 21
Pin 20
Pin 19
Pin 18
Pin 17
Pin 16
Pin 15
Pin 14
Pin 13
Pin 12
Pin 11
Pin 10
Pin 9
Pin 8
Pin 7
Pin 6
Pin 5
Pin 4
Pin 3
Pin 2
Pin 1
S1
PMU RESET

6. Plug a known good power cord into the computer. Do not turn on the computer.
7. On the power supply cable connector: connect the black lead of the volt meter to pin 23 and connect the red lead of the volt meter to pin 1.

Note: This is a bottom view of the connector when it is unplugged and facing up.



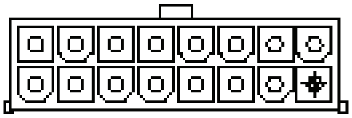
The volt meter should measure approximately +5V. If you do not get a reading of +5V, recheck the volt meter connections and measure the voltage again. If the voltage is still not present, replace the power supply.

Pinouts

Power Supply P1 Connector

Pin #	**Signal**	**Pin#**	**Signal**
1	+5Vstb	13	GND
2	GND	14	Power ON
3	FANtach	15	GND
4	GND	16	EMPTY
5	EMPTY	17	GND
6	GND	18	RTNaud (GND)
7	+12Vaud (12V2)	19	GND
8	GND	20	+5V sense
9	+3.3V sense	21	GND
10	GND	22	-12V
11	GND	23	GND
12	EMPTY	24	EMPTY

Power Supply P2 Connector

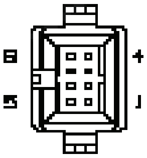


Pin#	Signal	Color	Pin#	Signal	Color
1	+3.3V	Orange	9	+5V	Red
2	+3.3V	Orange	10	+5V	Red
3	+3.3V	Orange	11	+5V	Red
4	+3.3V	Orange	12	+12V3	Yellow
5	Reserve		13	+12V3	Yellow
6	+12Vfan	Yellow	14	+12V1	Yellow
7	+12Vfan(12V2)	Yellow	15	+12V1	Yellow
8	+25V	White	16	RTNfan(GND)	Black

Power Supply P3 Connector

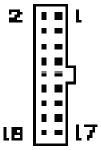
Pin#	Signal	Color	Pin#	Signal	Color
1	+5V	Red	5	+5V	Red
2	GND	Black	6	GND	Black
3	GND	Black	7	GND	Black
4	12V2	Yellow	8	+12V2	Yellow

Front Inlet Fan Connector



Pin#	Signal
1	FAN CPU Cpu AF MOTOR
2	FAN CPU AF TACH
3	FAN GND
4	FAN 12V
5	FAN CPU BF MOTOR
6	FAN CPU BF TACK
7	TEMP SENSE D-
8	TEMP SENSE D+

Front Panel Board Connector

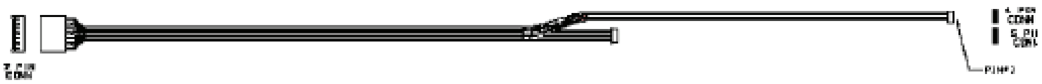


Pin#	Signal	Type
1	25V	
2	V-GND	
3	FW TPA	Twisted Pair Shield 110 Ohm
4	FW TPA +	Twisted Pair Shield 110 Ohm
5	CHASSIS GND FW	
6	CHASSIS GND USB	
7	FW TPB	Twisted Pair Shield 100 Ohm
8	FW TPB+	Twisted Pair Shield 100 Ohm
9	USB PWR	
10	USB GND	
11	USB	Twisted Pair Shield 60 Ohm
12	USB+	Twisted Pair Shield 60 Ohm
13	LED	
14	PWR BTN	
15	AUDIO SENSE	
16	AUDIO COM	Twisted TRI
17	AUDIO RIGHT	Twisted TRI
18	AUDIO LEFT	Twisted TRI

Optical and Serial ATA Hard Drive Cable Connectors

Power		Optical		SP1 (HD1)		SP2 (HD2)	
Pin#	**Color**	**Pin#**	**Color**	**Pin#**	**Color**	**Pin#**	**Color**
1	BLK	4	BLK				
2	BLK	3	BLK				
3	BLK	1	BLK				
4	BLK			2	BLK	2	BLK
5	BLK			3	BLK	3	BLK
6	BLK			1	BLK	1	BLK
7	BLK			4	BLK	4	BLK

Media Bay Temperature Sensor Cable



7 Pin Connector	Signal	5 Pin Connector	4 Pin Connector
1	3.3V	1	1
2	[ ]G B CLK	2	
3	] [G B DAT	2	
4	GND	4	2
5	OVER TEMP	5	
6	DOOR AJAR 1		3
7	3.3V SLEEP		4

Symptom Charts

How to Use the Symptom Charts

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to the product. Because cures are listed on the charts in the order of most likely solution, try the cures in the order presented. Verify whether or not the product continues to exhibit the symptom. If the symptom persists, try the next cure.

Note: If a cure instructs you to replace a module, reinstall the original module before you proceed to the next cure.

Important: The only way to shut off power completely to the computer and display is to disconnect their power plugs from the power source. Make sure the power cords to the computer and display are within easy reach.

Startup Failures

When testing a computer for the following symptoms, remove the side access panel so you can better observe or listen for fan movement.

Note: Be sure to check the "**DDR Memory**" and "**Power-On Self Test**" topics in the General Information section of this chapter. Incorrect installation of DIMMs or incompatible memory will not allow the system to start up correctly. For information on how to correctly install DIMMs, see the "**Memory (DIMMs)**" topic in the Take Apart chapter.

Important: The Power Mac G5 (June 2004 Dual 2.0 GHz) computer must have both processors properly seated during troubleshooting procedures. Because both processors in the Power Mac G5 (June 2004 Dual 2.5 GHz/Early 2005 Dual 2.7 GHz) computers are a single unit, the same is true of these models. All other models covered by this manual may be diagnosed with a single processor installed in the upper processor slot. (See table below for summary of troubleshooting configurations.)

Configurations for Troubleshooting Startup Failures

PMG5 (June 2004 Dual 2.0 GHz)	PMG5 (June 2004 Dual 2.5 GHz and Early 2005 Dual 2.7 GHz)	All other PMG5 models
Upper processor installed	Upper processor installed	Upper processor installed
Lower processor installed	Lower processor installed	No lower processor installed

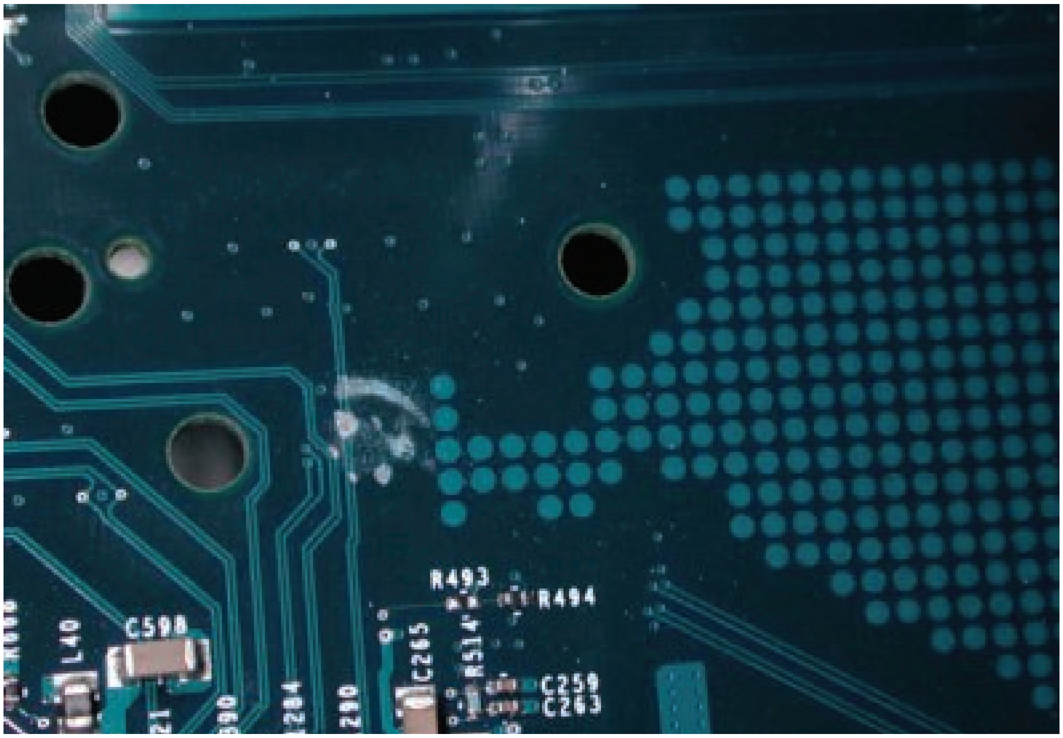
Note: The following symptoms and cures apply to all Power Mac G5 products in this manual except the Power Mac G5 (June 2004 Dual 2.5 GHz/Early 2005 2.7 GHz). For startup failures for these models, see "**Startup Failures for Power Mac G5 (Dual 2.5 GHz/Early 2005 2.7 GHz)**" later in this section.

Power-on LED does not illuminate when power button is pressed, fans do not spin, and there is no boot tone or video

1. Verify power outlet is good.
2. Replace power cord.
3. Reset the logic board. Refer to "**Resetting the PMU on the Logic Board**" in this chapter.
4. Verify power supply cables are fully connected.
5. Check for trickle voltage on the power supply connector. Refer to "**Power Supply Verification**" in this chapter. If verification fails, replace power supply.
6. Reseat front panel board cable.
7. Verify that processors are properly seated.
8. Verify that processors' mounting screws are properly tightened.
9. Replace front panel board cable.
10. Test the front panel board and power button using the front panel board troubleshooting tool. Refer to "**Front Panel Board Troubleshooting**" in this chapter. If the computer starts up correctly, go to step 11. Otherwise, go to step 14.
11. Test whether the front panel board or power button is at fault. Remove the installed front panel board and swap it for the known-good front panel board in the front panel board troubleshooting tool. Then connect the troubleshooting tool to the logic board of a known-good Power Mac G5 and start it up using the tool. If the computer does not start up correctly, go to step 12. Otherwise, go to step 13.
12. Replace front panel board.
13. Replace power button.
14. Replace logic board.
15. Replace power supply.

Power Mac G5 (June 2004): Power-on LED illuminates when pressed in, but goes out when button is released, fans spin, and there is no boot tone or video

1. Verify that the processors are properly seated.
2. Verify that the processors' mounting screws are properly tightened.
3. Remove the processors and check for damage to the logic board under the processors. If you see damage (see example below), replace the logic board.



Note: For the Power Mac G5 (June 2004 Dual 2.0 GHz), go to step 5. For single-processor computers, go to step 6.

4. Remove lower processor. If the computer starts up correctly, go to step 5. Otherwise, go to step 6.
5. Replace lower processor.
6. Replace upper processor.
7. Check for trickle voltage on the power supply connector. Refer to "**Power Supply Verification**" in this chapter. If verification fails, replace power supply.
8. Replace logic board.

Power-on LED illuminates when power button is pressed but fans do not spin (or spin only momentarily) and there is no boot tone or video

Note: This symptom pertains to the Power Mac G5 and Power Mac G5 (June 2004 Dual 1.8/2.0 GHz)

1. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.)
2. Reset logic board. Refer to "Resetting the PMU on the Logic Board" in this chapter.
3. Verify power supply cables are fully connected.
   Note: For the Power Mac G5 (June 2004 Dual 2.0 GHz), go to step 5.
4. Remove lower processor (if installed). If the computer starts up correctly, go to step 5. Otherwise, go to step 7.
5. Reseat lower processor.
6. Replace lower processor.
7. Reseat upper processor.
8. Replace upper processor.
9. Check for trickle voltage on the power supply connector. Refer to "**Power Supply Verification**" in this chapter. If verification fails, replace power supply.
10. Replace logic board.

Power-on LED illuminates when power button is pressed and fans spin continuously but there is no boot tone or video

1. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.)
2. Verify speaker cable is fully seated.
3. Reset logic board. Refer to "**Resetting the PMU on the Logic Board**" in this chapter.
   Note: For the Power Mac G5 (June 2004 Dual 2.0 GHz), go to step 5.
4. Remove lower processor (if installed). If the computer starts up correctly, go to step 5. Otherwise, go to step 7.
5. Reseat lower processor
6. Replace lower processor
7. Reseat upper processor
8. Replace upper processor.
9. Replace logic board

Power-on LED illuminates when power button is pressed, fans spin, and boot tone chimes, but there is no video

1. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.)
2. Reset PRAM (restart computer while holding down Command-Option-P-R keys until second boot tone chimes)
3. Replace video card
4. Reset logic board. Refer to "**Resetting the PMU on the Logic Board**" in this chapter.
5. Replace logic board

Power-on LED does not illuminate when power button is pressed, but fans spin, boot tone chimes, and there is video

1. Reseat front panel board cable
2. Replace front panel board cable
3. Test the front panel board and power button using the front panel board troubleshooting tool. Refer to "**Front Panel Board Troubleshooting**" in this chapter. If the computer starts up correctly, go to step 4. Otherwise, go to step 7.
4. Test whether the front panel board or power button is at fault. Remove the installed front panel board and swap it for the known-good front panel board in the front panel board troubleshooting tool. Then connect the troubleshooting tool to the logic board of a known-good Power Mac G5 and start it up using the tool. If the computer does not start up correctly, go to step 5. Otherwise, go to step 6.
5. Replace front panel board
6. Replace power button
7. Replace logic board

Startup Failures for Power Mac G5 (June 2004 Dual 2.5 GHz/ Early 2005 Dual 2.7 GHz)

Power-on LED illuminates when power button is pressed but fans do not spin (or spin only momentarily) and there is no boot tone or video

1. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.)
2. Reset logic board. Refer to "**Resetting the PMU on the Logic Board**" in this chapter.
3. Verify power supply cables are fully connected
4. Reseat the processor
5. Replace the processor
6. Check for trickle voltage on the power supply connector. Refer to "**Power Supply Verification**" in this chapter. If verification fails, replace power supply.
7. Replace logic board

Power-on LED illuminates when power button is pressed and fans spin continuously but there is no boot tone or video

1. Reseat video card. (Make sure video card is fully inserted in connector and end of card is secured by the connector latch.)
2. Verify speaker cable is fully seated.
3. Reset logic board. Refer to "**Resetting the PMU on the Logic Board**" in this chapter.
4. Reseat the processor
5. Replace the processor
6. Replace logic board

Power-on LED illuminates, fans spin up, no boot tone, and the system shuts down within a few minutes

1. Reseat the processor
2. Replace the processor
3. Replace the logic board
4. Replace the power supply

Power-on LED illuminates, fans and processor pump run harder, there is no boot and the system shuts down within a few minutes

1. Remove the processor and look for loss of fluid on the absorbent liner on top of the power supply. If you see drops of fluid, replace the processor, otherwise go on to the next step.
2. Reseat the processor.
3. Replace the processor
4. Replace the logic board
5. Replace the power supply

Fluid leak is suspected and the computer is plugged in

1. Unplug the computer
2. Put on rubber gloves if handling a liquid cooling module that is leaking or suspected to be leaking
3. Remove the processor
4. Wipe the spill using rags, paper towels, or other suitable material. Contain and dispose of the cleaning materials according to locals laws and regulations.
5. Wash the skin with running water
6. Replace the processor
7. Replace modules that show corrosion to the traces or solder joints.

Fans

Individual fan failure

1. Replace fan
   Exception: The drive fan and blower located between the optical and hard drives cannot be replaced. You must replace the enclosure for these two parts.
2. Replace logic board

All fans run at high speed

Run Apple Service Diagnostic (refer to "Thermal Calibration" earlier in this chapter).

Media bay fans run at high speed

Note: If any of the following three conditions cannot be verified, the red LED on the logic board near the front panel board will be lit.

1. Verify that the clear plastic air deflector door is in place.
2. Verify that the white sensor label is not damaged and is in place on the lower right tab of the air deflector door.
3. Verify that the air deflector sensor board is operating properly.
   Note: You can differentiate a bad sensor label from a bad sensor board by the following: Remove the air deflector door. Slide a folded piece of paper through the slot in the enclosure where the right tab of the air deflector would normally be inserted. If the red LED goes out (but stays on with the door in place), the sensor label on the door is missing or damaged.
4. Check the sensor cable connection on the logic board (second from right connector located directly below the hard drives).
5. Replace the logic board.
6. Replace the air deflector sensor board.

Computer goes to sleep for no apparent reason

Two additional symptoms: The system log typically includes a message similar to: "PowerMac7,3 Thermal Manager: Thermal Runaway Detected: System Will Sleep." The customer may also note that the fans ramp up to a higher speed shortly before the computer sleeps.

1. Update the operating system to Mac OS X 10.3.6 or above.
2. If the system log still reports Thermal Runaway, replace the processor module.

Other Failures

Duct door sensor

1. Reseat interlock sensor board cable
2. Replace interlock sensor board
3. Replace logic board
4. Replace enclosure

Hard drive (kernel panics, hard drive does not mount, or performance slows when second hard drive is installed)

1. Replace hard drive guide screws
2. Replace hard drive

Optical drive

1. Replace optical drive cable
2. Replace optical drive
3. Replace logic board

FireWire port (front panel A)

1. Reseat front panel board cable.
2. Replace front panel board cable
3. Replace front panel board
4. Replace logic board

Firewire port (rear A<->B)

Replace logic board

Firewire port (rear B<->B)

Replace logic board

Internal speakers (left or right fails, boot tone)

Replace logic board

Internal speakers (high-pitch tone)

1. Replace power supply
2. Replace logic board

USB 2.0 (front port)

1. Replace front panel board cable
2. Replace front panel board
3. Replace logic board

USB 2.0 (rear-top port or rear bottom port)

Replace logic board

Modem

1. Replace modem
2. Replace modem filter board
3. Replace logic board

AirPort

1. Replace AirPort Card
2. Replace antenna card
3. Replace logic board

Bluetooth

1. Replace Bluetooth card
2. Replace antenna card
3. Replace logic board

Audio IO (front line in <-> headphones)

1. Replace front panel board cable
2. Replace front panel board
3. Reposition logic board
4. Replace logic board

Audio IO (rear line in <-> line out; rear line out <-> line out)

Replace logic board

Service Source

Upgrades

Power Mac G5

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Modem Upgrade Kit

Apple offers a modem board as a configure-to-order (CTO) option for the Power Mac G5 (Early 2005) computer. For customers who purchase this computer in retail or want to add a modem board after purchase, Apple will provide an upgrade kit for Apple Authorized Service Providers. Installation of the upgrade kit must be performed by an Apple Authorized Service Provider. Damage resulting from installation by anyone other than a service provider will not be covered under the product's warranty.

The upgrade kit is available on GSX. Authorized Service Providers that are also Apple Authorized Resellers may purchase the upgrade kit from the Apple Reseller store.

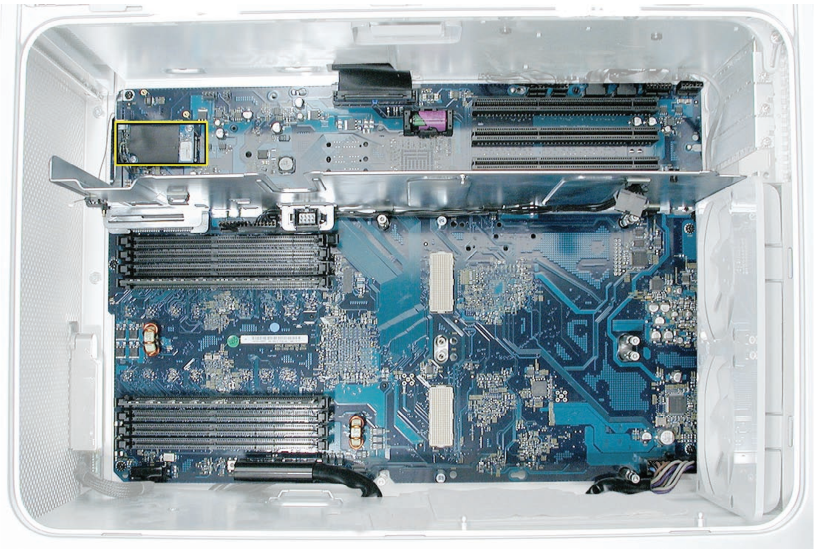
Tools

The only tools required for this procedure are a Phillips and a small, flatblade screwdriver.

Preliminary Steps

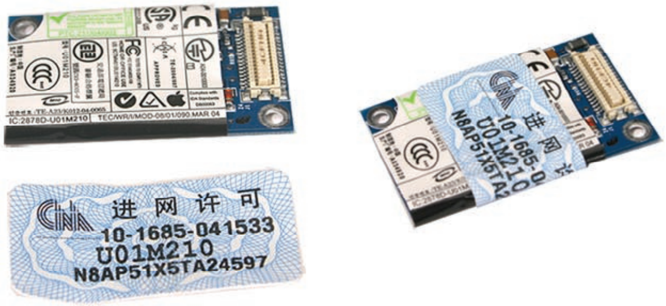
Before you begin, open the computer, lay it on its side with the access side facing up, and **remove the speaker/fan assembly**.

Part Location

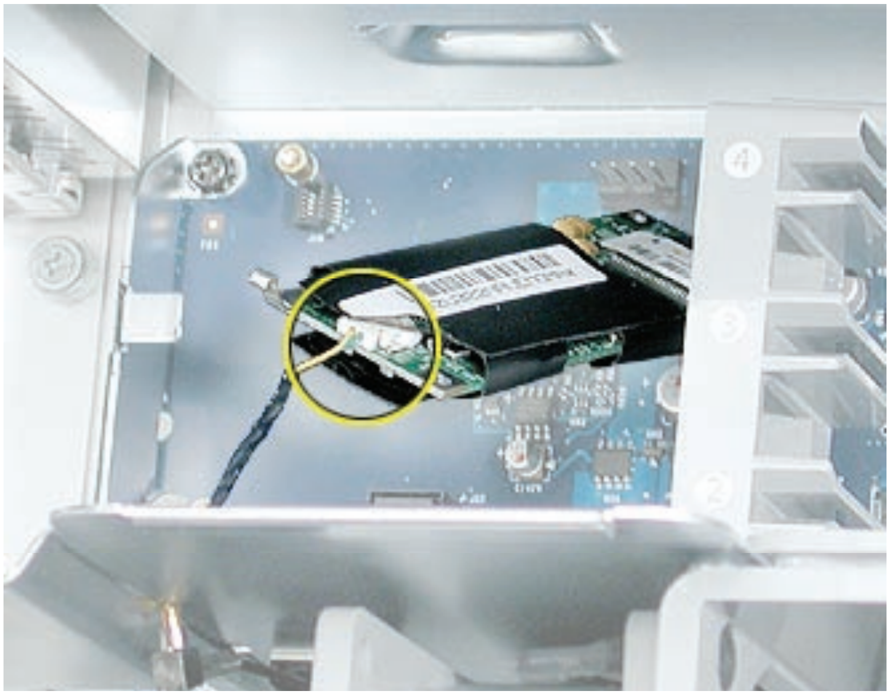


Procedure

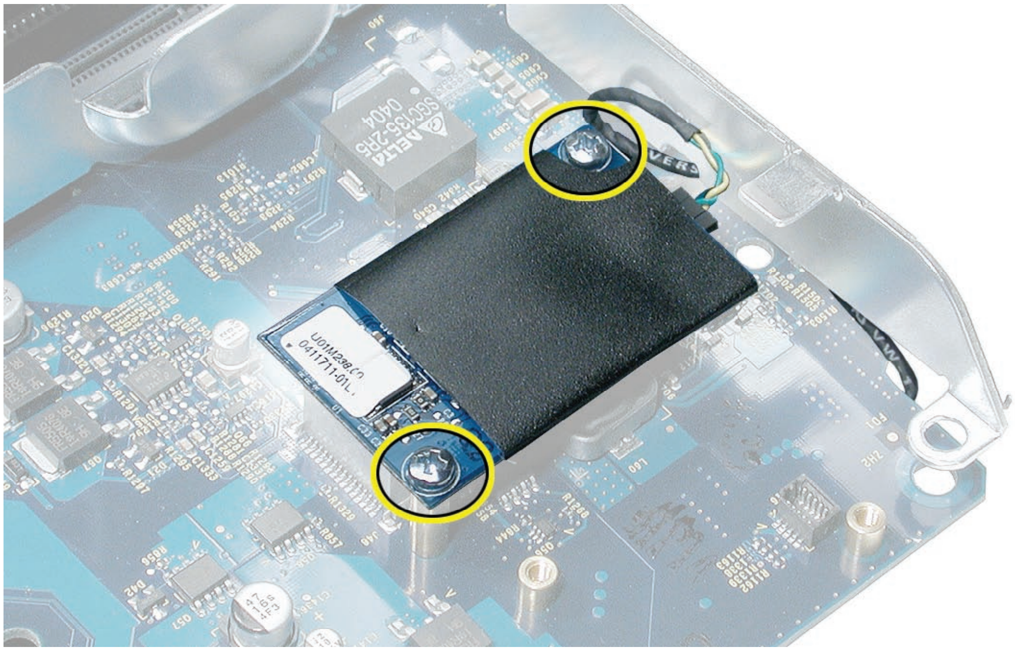
Note for Chinese Installations Only: The Chinese upgrade kit includes a China-specific label that you must apply to the modem. To attach the label, remove the protective backing and wrap the label around the modem as illustrated below.


进 网 许 可
10-1685-041533
U01M210
N8AP51X5TA24597

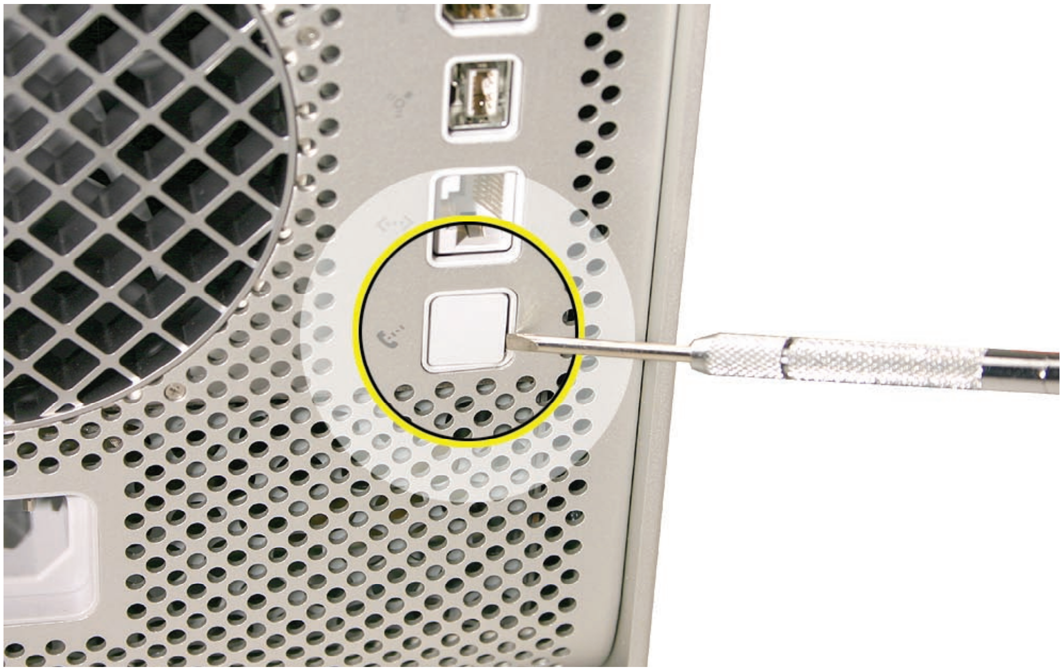
1. Connect the modem filter cable to the connector on the end of the modem board.



2. Connect the modem to the modem connector on the logic board and install the two mounting screws.

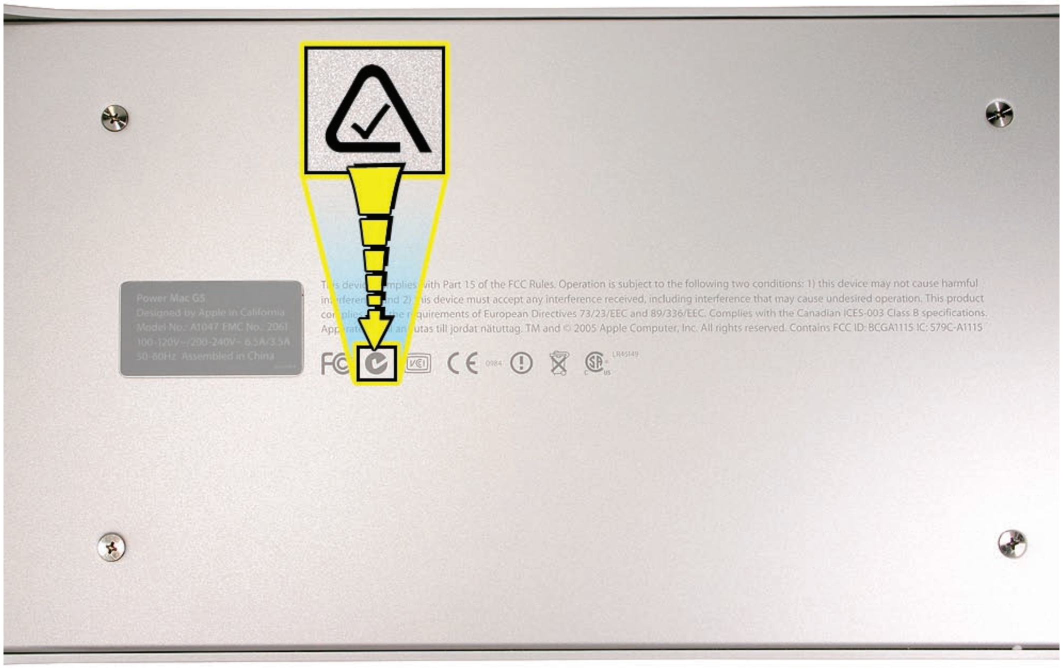


3. With a small, flat-blade screwdriver, pry up and remove the modem plug on the computer's back panel.



4. Re-install the speaker/fan bracket and close the computer.

Important Note for Australian Installations: Some modem upgrade kits include a special A-Tick label for Australia. This label must be applied to the compliance symbols on the bottom of the computer after the modem is installed. There are two sizes of A-Tick labels included in the kit. Please apply the larger of the two labels so that it covers the C-tick symbol, as illustrated below.


Power Mac G5
Designed by Apple in California
Model No.: A1047 EMC No.: 2061
100-120V~/200-240V~ 6.5A/3.5A
50-60Hz Assembled in China
Th s devic mplies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) this device may not cause harmful
in erferen nd 2) his device must accept any interference received, including interference that may cause undesired operation. This product
co plies he r quirements of European Directives 73/23/EEC and 89/336/EEC. Complies with the Canadian ICES-003 Class B specifications.
App rat an utas till jordat nätuttag. TM and © 2005 Apple Computer, Inc. All rights reserved. Contains FCC ID: BCGA1115 IC: 579C-A1115
0984
LR45149

Bluetooth Upgrade Kit

Apple offers a Bluetooth card as a configure-to-order (CTO) option for the Power Mac G5 (Early 2005) computer. For customers who purchase this computer in retail or want to add a Bluetooth card after purchase, Apple will provide an upgrade kit for Apple Authorized Service Providers. Installation of the upgrade kit must be performed by an Apple Authorized Service Provider. Damage resulting from installation by anyone other than a service provider will not be covered under the product's warranty.

The upgrade kit is available on GSX. Authorized Service Providers that are also Apple Authorized Resellers may purchase the upgrade kit from the Apple Reseller store.

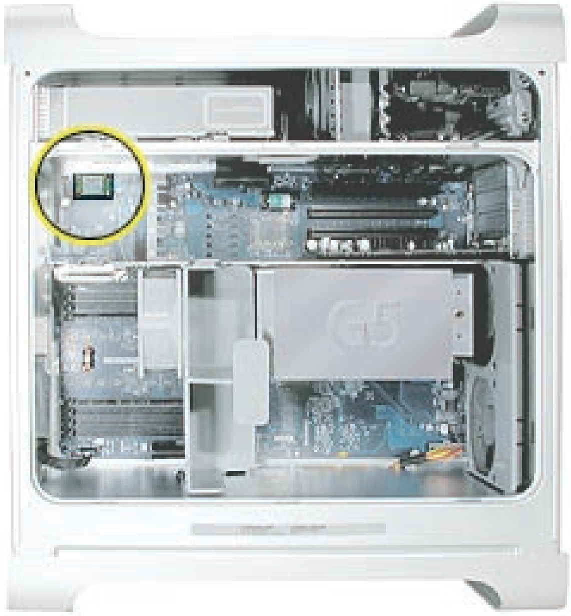
Tools

The only tool required for this procedure is a Phillips screwdriver.

Preliminary Steps

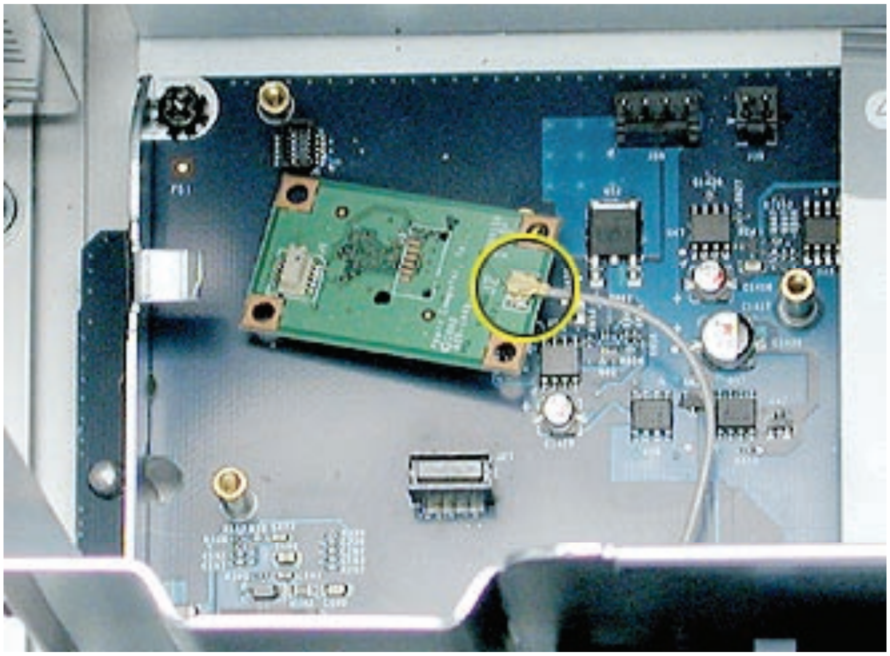
Before you begin, open the computer, lay it on its side with the access side facing up, and **remove the speaker/fan assembly**.

Part Location

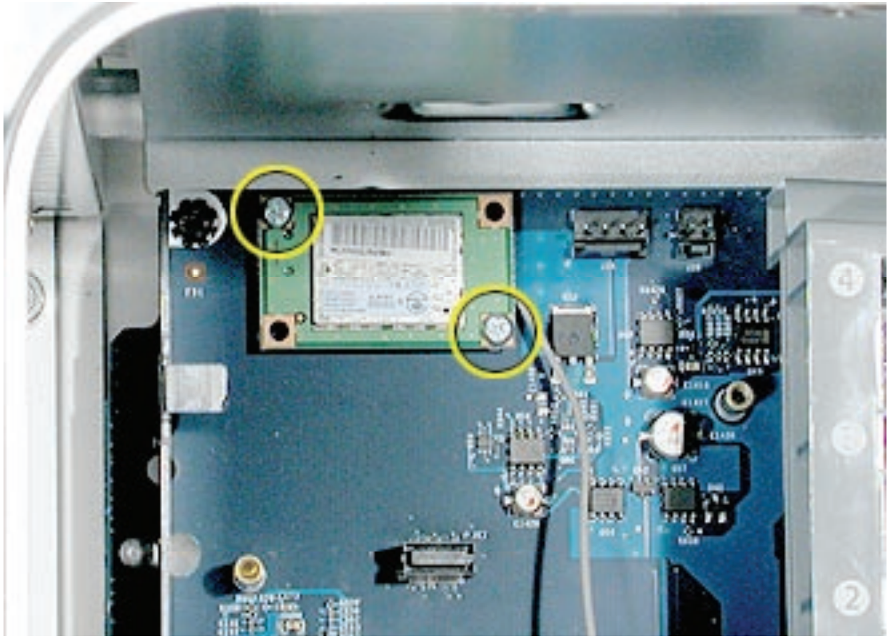


Procedure

1. Carefully connect the Bluetooth antenna cable to the underside of the Bluetooth card.



2. Turn the card over, and connect it to the Bluetooth connector on the logic board.
3. Install the two Bluetooth card mounting screws.



4. Re-install the speaker/fan bracket and close the computer.

Service Source

Views

Power Mac G5

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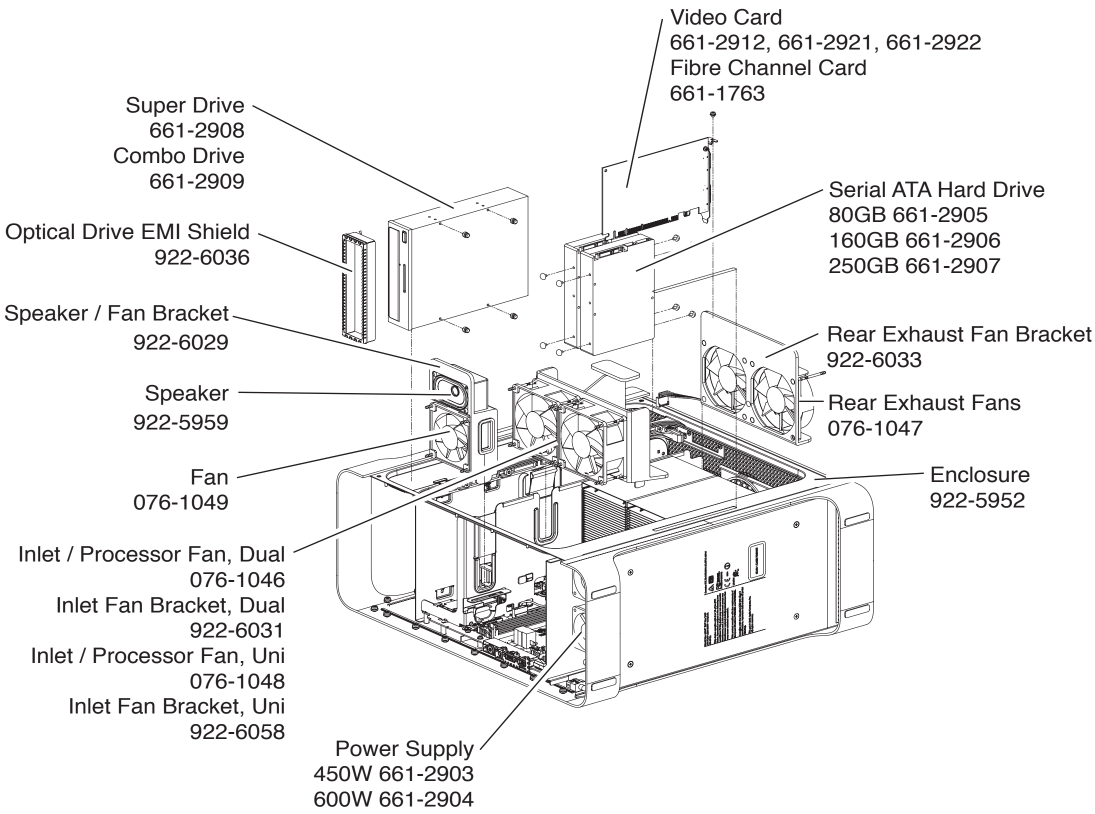
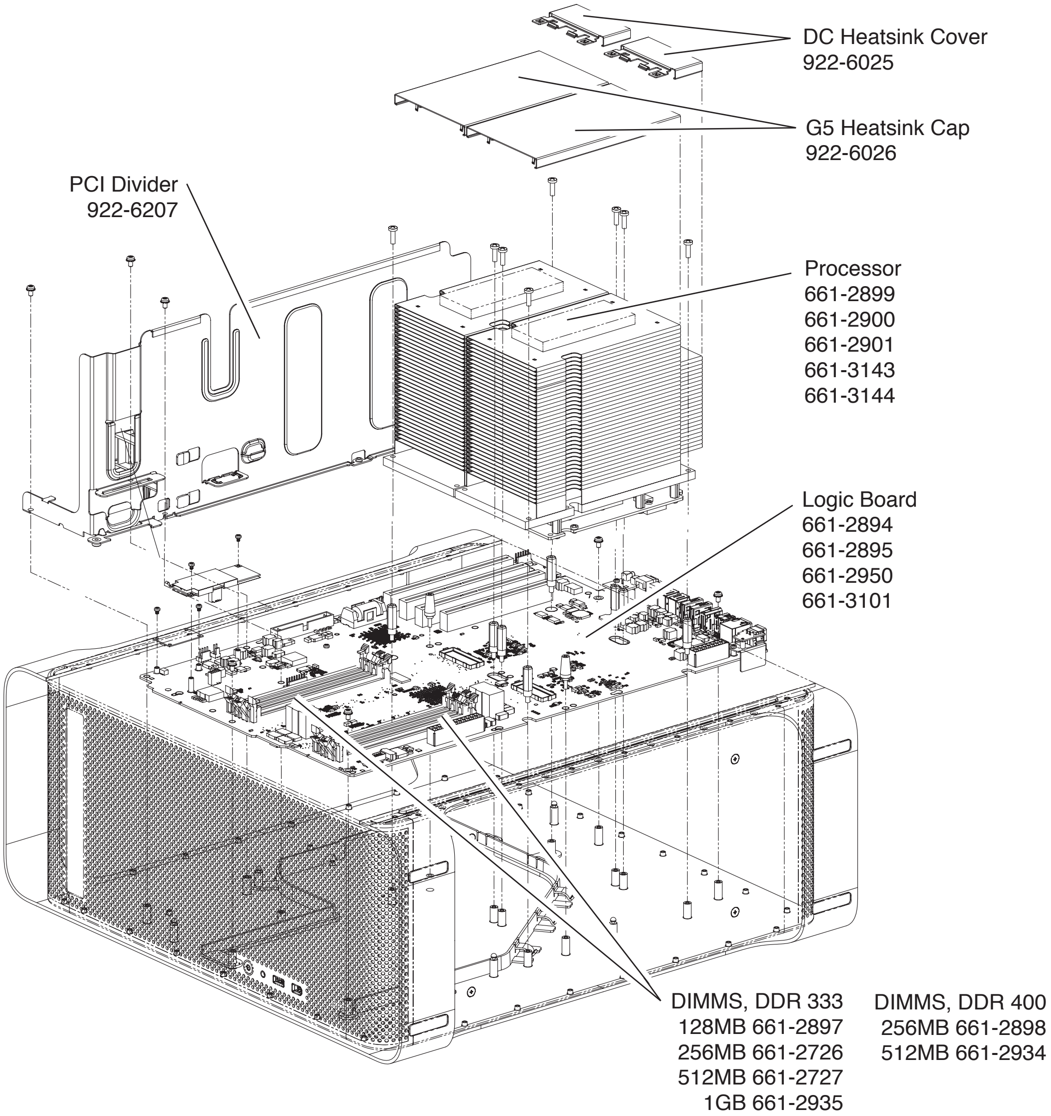
Exploded Views, Power Mac G5

Exploded View 1

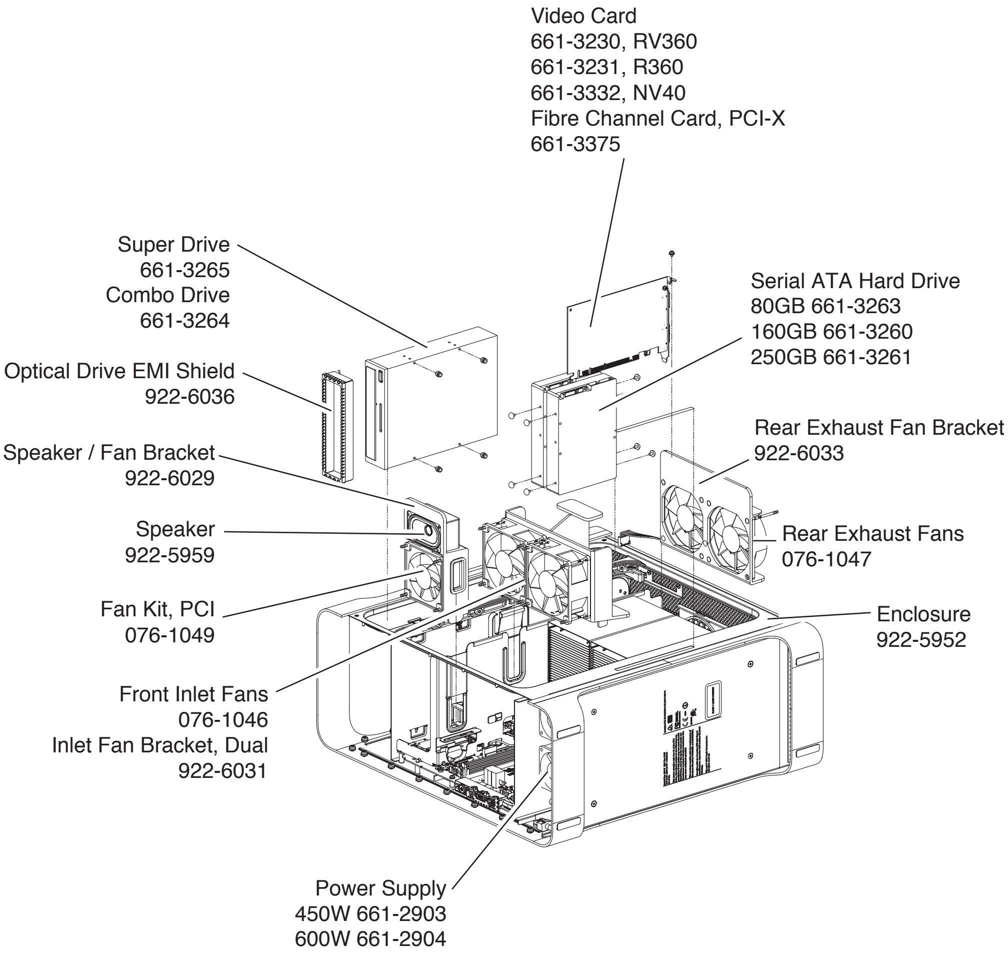

Video Card
661-2912, 661-2921, 661-2922
Fibre Channel Card
661-1763
Super Drive
661-2908
Combo Drive
661-2909
Serial ATA Hard Drive
80GB 661-2905
160GB 661-2906
250GB 661-2907
Optical Drive EMI Shield
922-6036
Speaker / Fan Bracket
922-6029
Rear Exhaust Fan Bracket
922-6033
Speaker
922-5959
Rear Exhaust Fans
076-1047
Fan
076-1049
Enclosure
922-5952
Inlet / Processor Fan, Dual
076-1046
Inlet Fan Bracket, Dual
922-6031
Inlet / Processor Fan, Uni
076-1048
Inlet Fan Bracket, Uni
922-6058
Power Supply
450W 661-2903
600W 661-2904

Exploded View #2

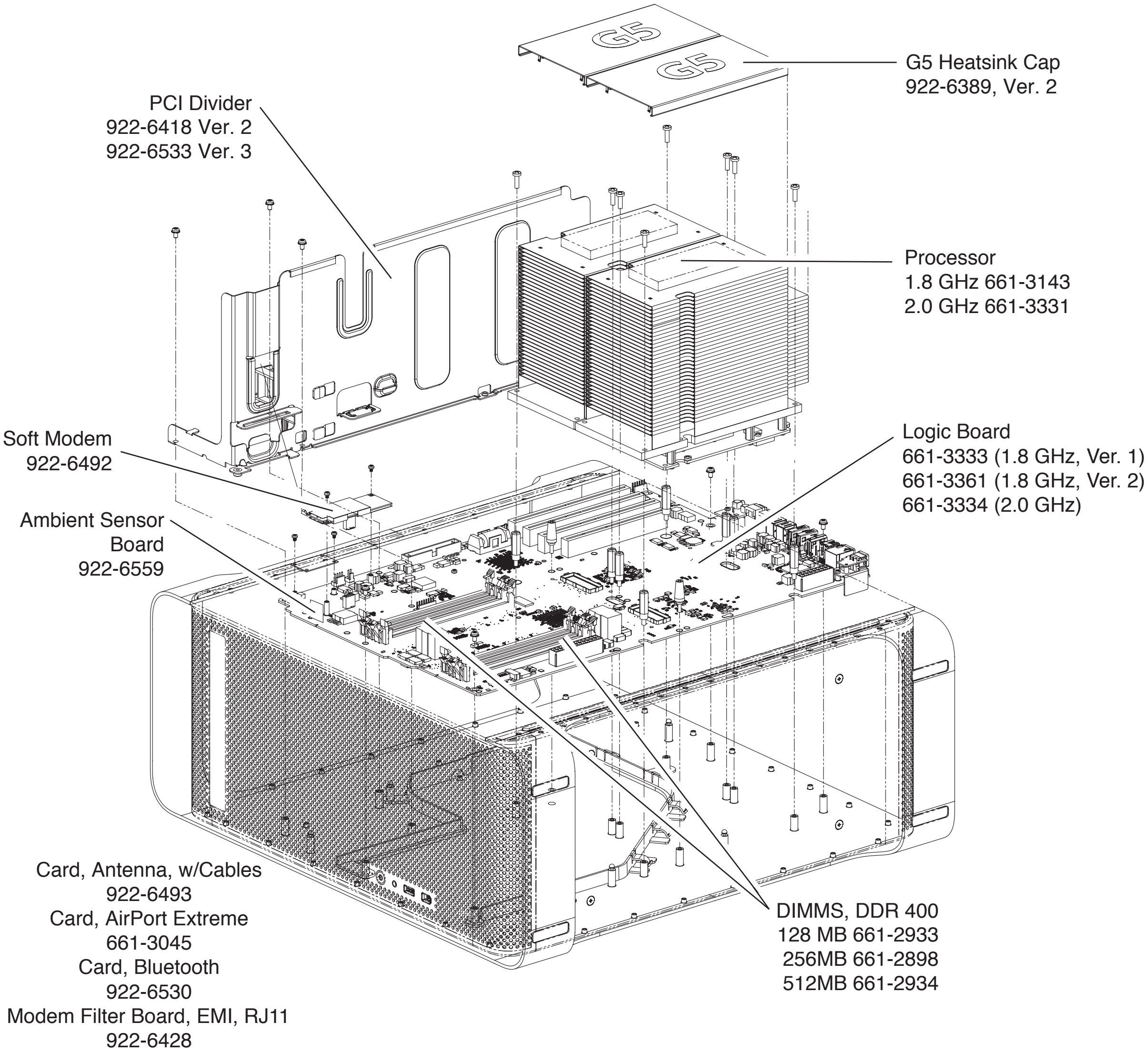

DC Heatsink Cover
922-6025
G5 Heatsink Cap
922-6026
PCI Divider
922-6207
Processor
661-2899
661-2900
661-2901
661-3143
661-3144
Logic Board
661-2894
661-2895
661-2950
661-3101
DIMMS, DDR 333
128MB 661-2897
256MB 661-2726
512MB 661-2727
1GB 661-2935
DIMMS, DDR 400
256MB 661-2898
512MB 661-2934

Exploded Views, Power Mac G5 (June 2004 Dual 1.8/2.0 GHz)

Exploded View 1

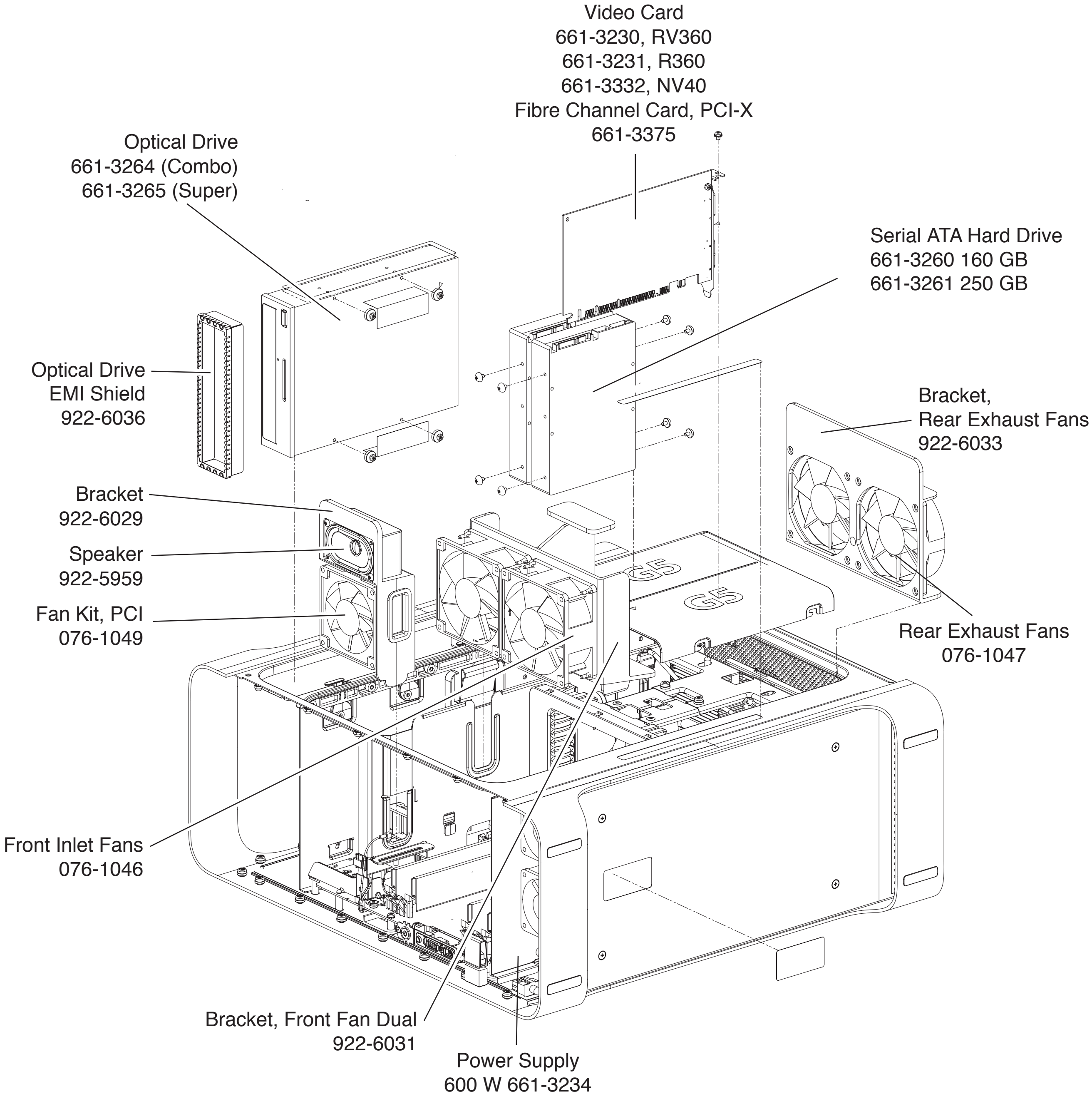

Video Card
661-3230, RV360
661-3231, R360
661-3332, NV40
Fibre Channel Card, PCI-X
661-3375
Super Drive
661-3265
Combo Drive
661-3264
Serial ATA Hard Drive
80GB 661-3263
160GB 661-3260
250GB 661-3261
Optical Drive EMI Shield
922-6036
Rear Exhaust Fan Bracket
922-6033
Speaker / Fan Bracket
922-6029
Speaker
922-5959
Rear Exhaust Fans
076-1047
Fan Kit, PCI
076-1049
Enclosure
922-5952
Front Inlet Fans
076-1046
Inlet Fan Bracket, Dual
922-6031
Power Supply
450W 661-2903
600W 661-2904

Exploded View #2

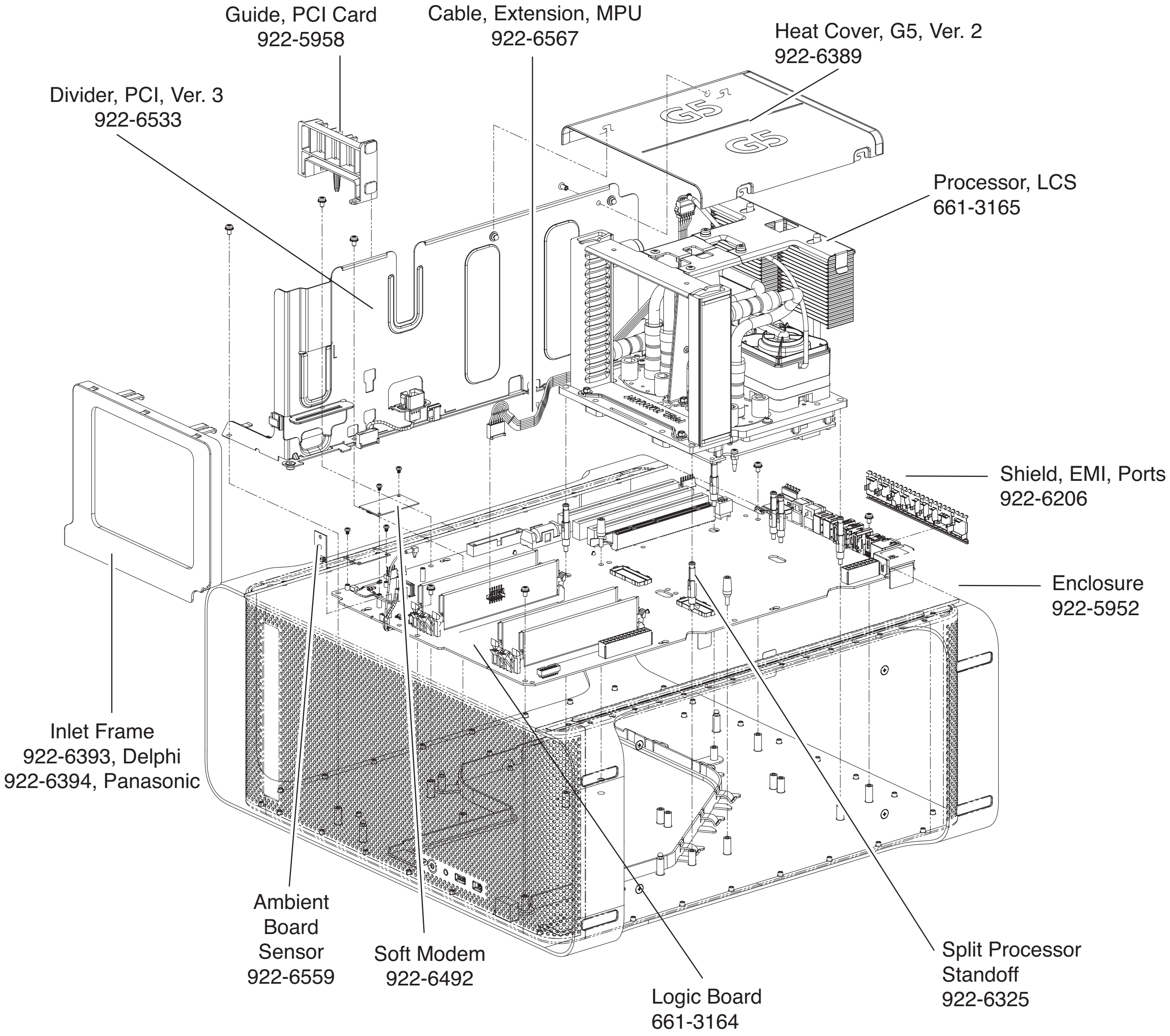

G5 Heatsink Cap
922-6389, Ver. 2
PCI Divider
922-6418 Ver. 2
922-6533 Ver. 3
Processor
1.8 GHz 661-3143
2.0 GHz 661-3331
Soft Modem
922-6492
Logic Board
661-3333 (1.8 GHz, Ver. 1)
661-3361 (1.8 GHz, Ver. 2)
661-3334 (2.0 GHz)
Ambient Sensor
Board
922-6559
Card, Antenna, w/Cables
922-6493
Card, AirPort Extreme
661-3045
Card, Bluetooth
922-6530
Modem Filter Board, EMI, RJ11
922-6428
DIMMS, DDR 400
128 MB 661-2933
256MB 661-2898
512MB 661-2934

Exploded Views, Power Mac G5 (June 2004 Dual 2.5 GHz)

Exploded View 1

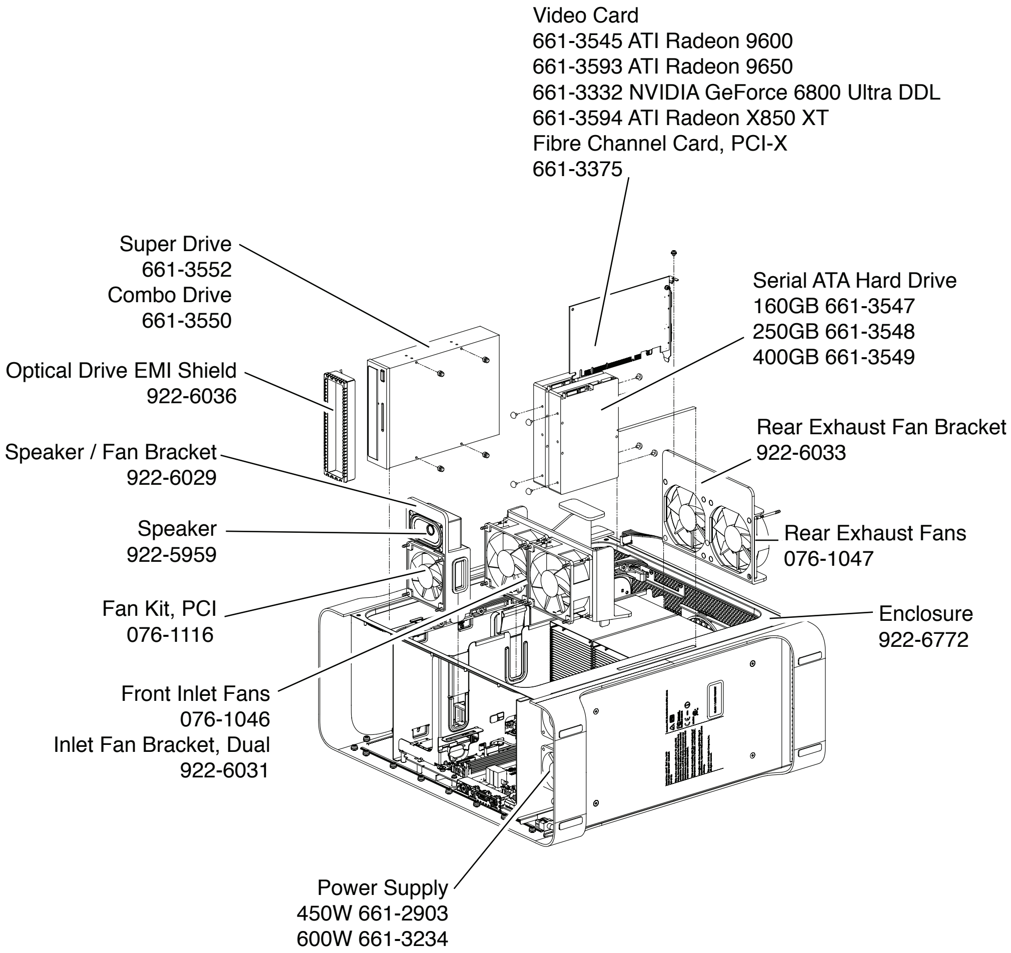

Video Card
661-3230, RV360
661-3231, R360
661-3332, NV40
Fibre Channel Card, PCI-X
661-3375
Optical Drive
661-3264 (Combo)
661-3265 (Super)
Serial ATA Hard Drive
661-3260 160 GB
661-3261 250 GB
Optical Drive
EMI Shield
922-6036
Bracket,
Rear Exhaust Fans
922-6033
Bracket
922-6029
Speaker
922-5959
Fan Kit, PCI
076-1049
Rear Exhaust Fans
076-1047
G5
G5
Front Inlet Fans
076-1046
Bracket, Front Fan Dual
922-6031
Power Supply
600 W 661-3234

Exploded View #2

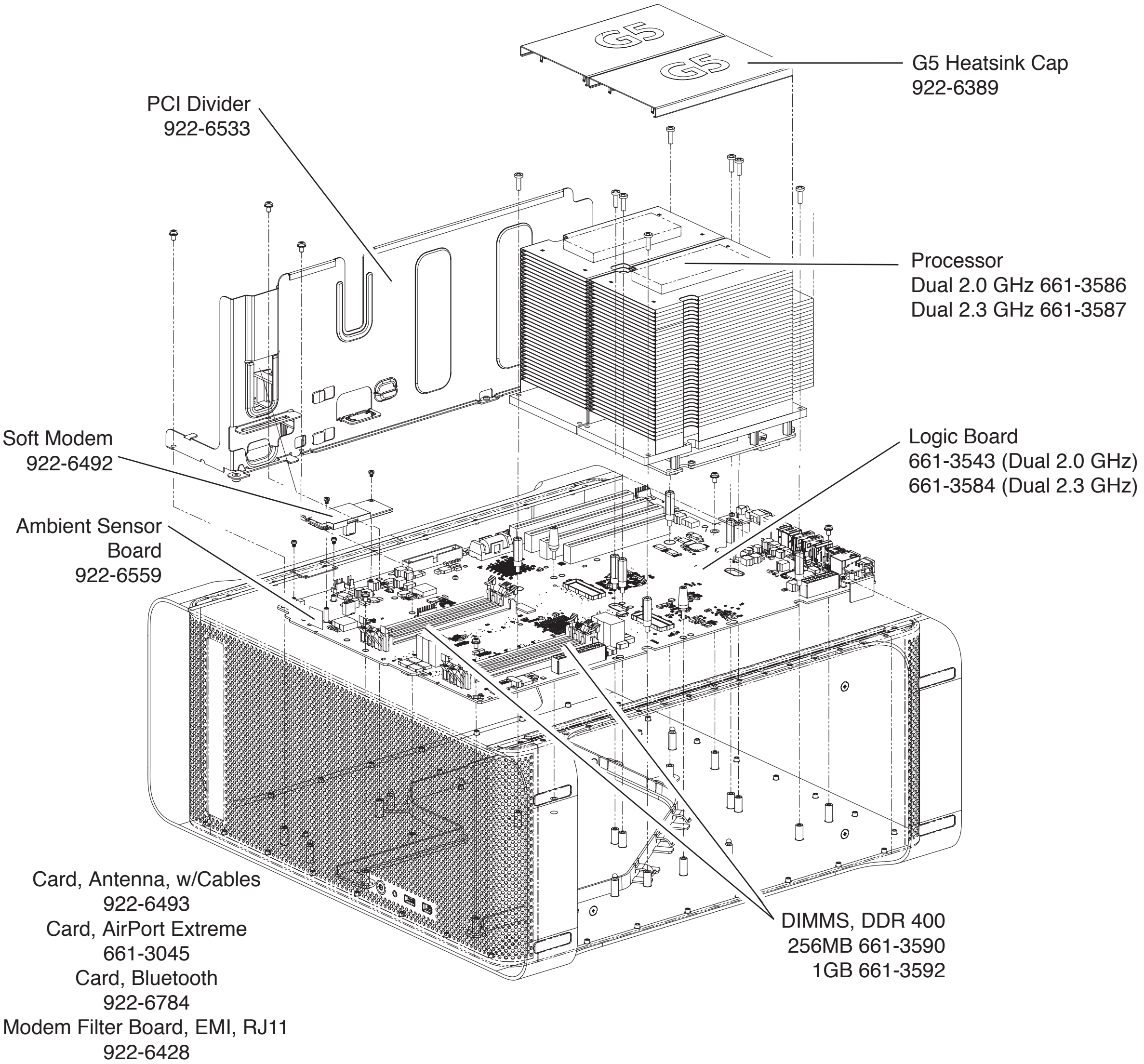

Guide, PCI Card
922-5958
Cable, Extension, MPU
922-6567
Heat Cover, G5, Ver. 2
922-6389
Divider, PCI, Ver. 3
922-6533
Processor, LCS
661-3165
Shield, EMI, Ports
922-6206
Enclosure
922-5952
Inlet Frame
922-6393, Delphi
922-6394, Panasonic
Ambient
Board
Sensor
922-6559
Soft Modem
922-6492
Logic Board
661-3164
Split Processor
Standoff
922-6325

Exploded Views, Power Mac G5 (Early 2005 Dual 2.0/2.3 GHz)

Exploded View 1

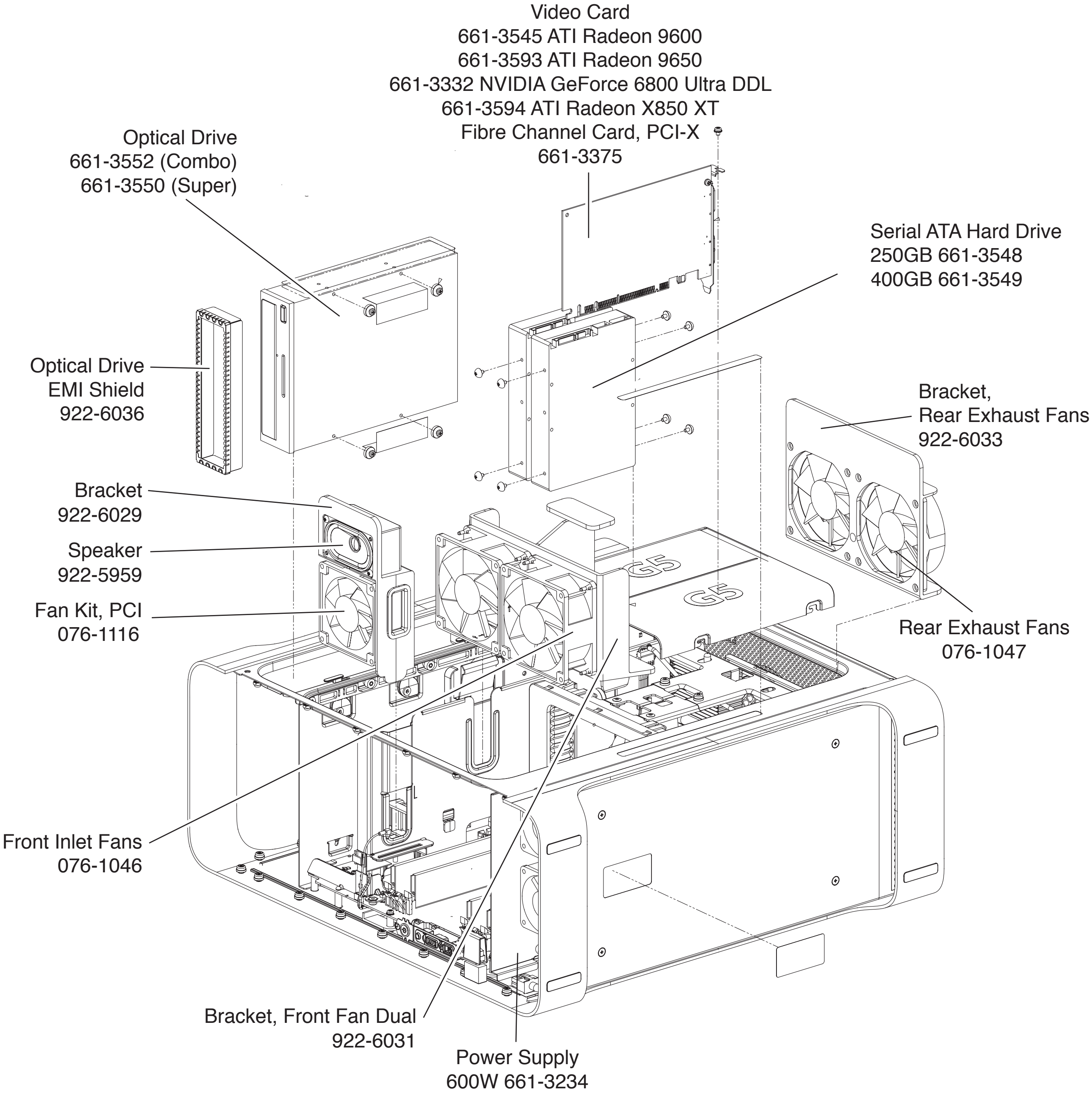

Video Card
661-3545 ATI Radeon 9600
661-3593 ATI Radeon 9650
661-3332 NVIDIA GeForce 6800 Ultra DDL
661-3594 ATI Radeon X850 XT
Fibre Channel Card, PCI-X
661-3375
Super Drive
661-3552
Combo Drive
661-3550
Serial ATA Hard Drive
160GB 661-3547
250GB 661-3548
400GB 661-3549
Optical Drive EMI Shield
922-6036
Rear Exhaust Fan Bracket
922-6033
Speaker / Fan Bracket
922-6029
Speaker
922-5959
Rear Exhaust Fans
076-1047
Fan Kit, PCI
076-1116
Enclosure
922-6772
Front Inlet Fans
076-1046
Inlet Fan Bracket, Dual
922-6031
Power Supply
450W 661-2903
600W 661-3234

Exploded View #2

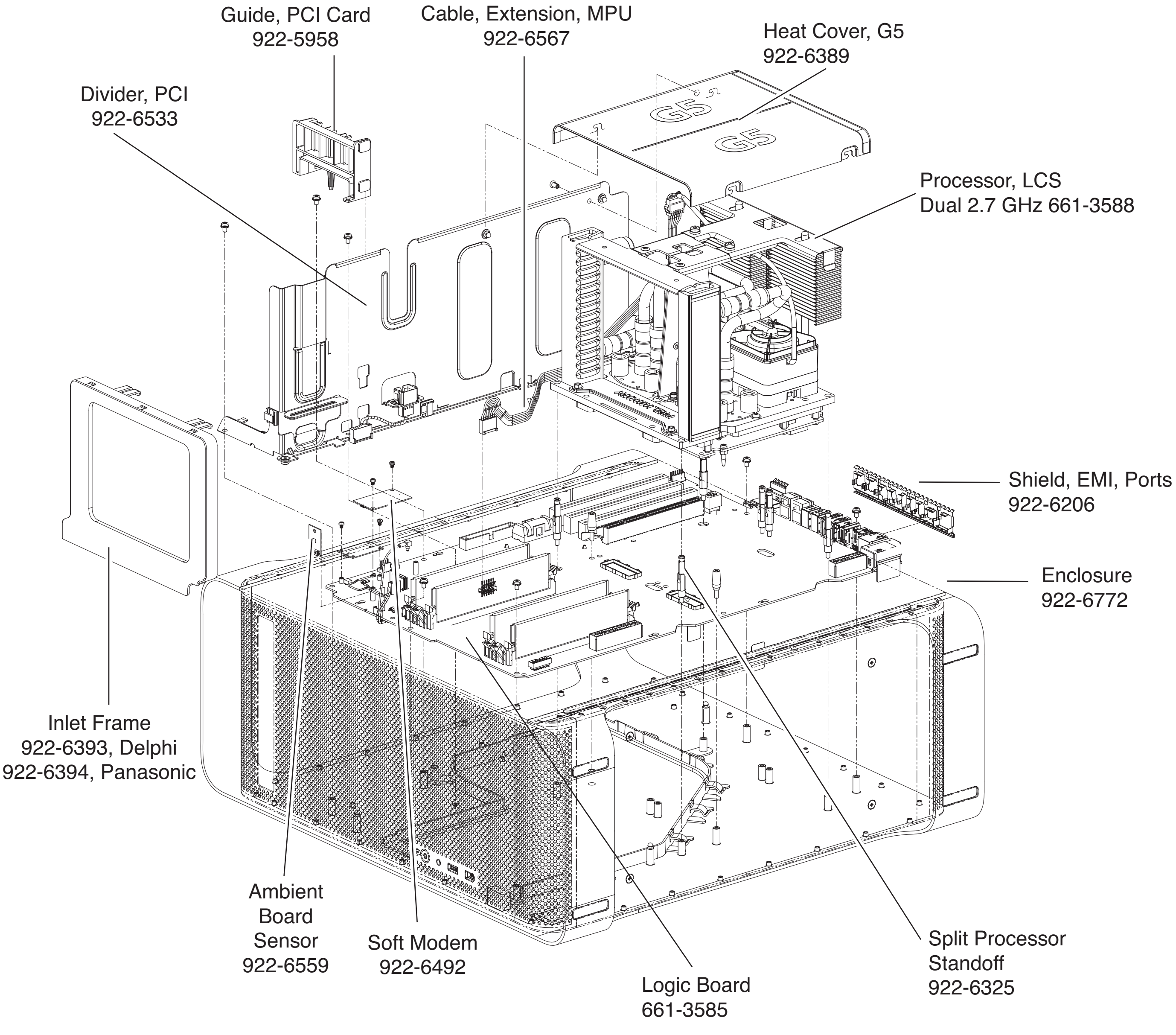

G5 Heatsink Cap
922-6389
PCI Divider
922-6533
Processor
Dual 2.0 GHz 661-3586
Dual 2.3 GHz 661-3587
Soft Modem
922-6492
Logic Board
661-3543 (Dual 2.0 GHz)
661-3584 (Dual 2.3 GHz)
Ambient Sensor
Board
922-6559
Card, Antenna, w/Cables
922-6493
Card, AirPort Extreme
661-3045
Card, Bluetooth
922-6784
Modem Filter Board, EMI, RJ11
922-6428
DIMMS, DDR 400
256MB 661-3590
1GB 661-3592
G5
G5

Exploded Views, Power Mac G5 (Early 2005 Dual 2.7 GHz)

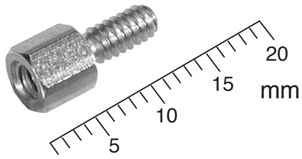
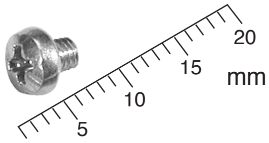
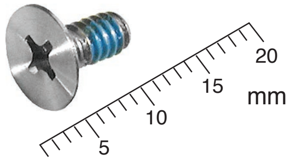
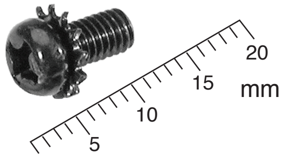
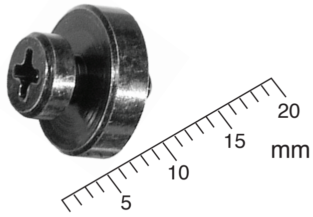
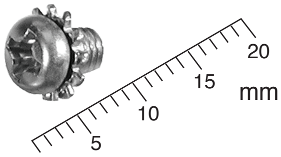
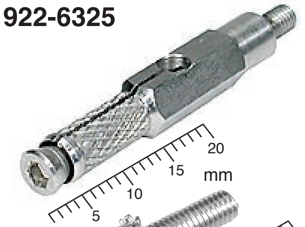
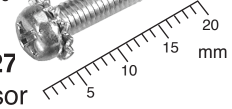
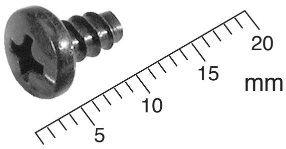
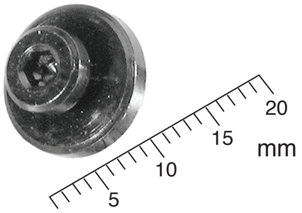
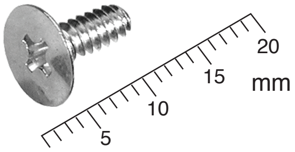
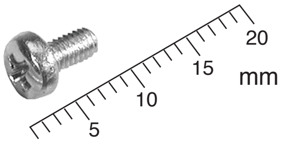
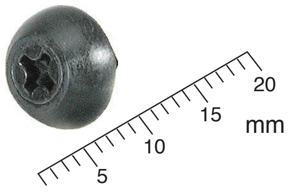
Exploded View 1


Video Card
661-3545 ATI Radeon 9600
661-3593 ATI Radeon 9650
661-3332 NVIDIA GeForce 6800 Ultra DDL
661-3594 ATI Radeon X850 XT
Fibre Channel Card, PCI-X
661-3375
Optical Drive
661-3552 (Combo)
661-3550 (Super)
Serial ATA Hard Drive
250GB 661-3548
400GB 661-3549
Optical Drive
EMI Shield
922-6036
Bracket,
Rear Exhaust Fans
922-6033
Bracket
922-6029
Speaker
922-5959
Fan Kit, PCI
076-1116
Rear Exhaust Fans
076-1047
Front Inlet Fans
076-1046
Bracket, Front Fan Dual
922-6031
Power Supply
600W 661-3234
G5
G5

Exploded View #2

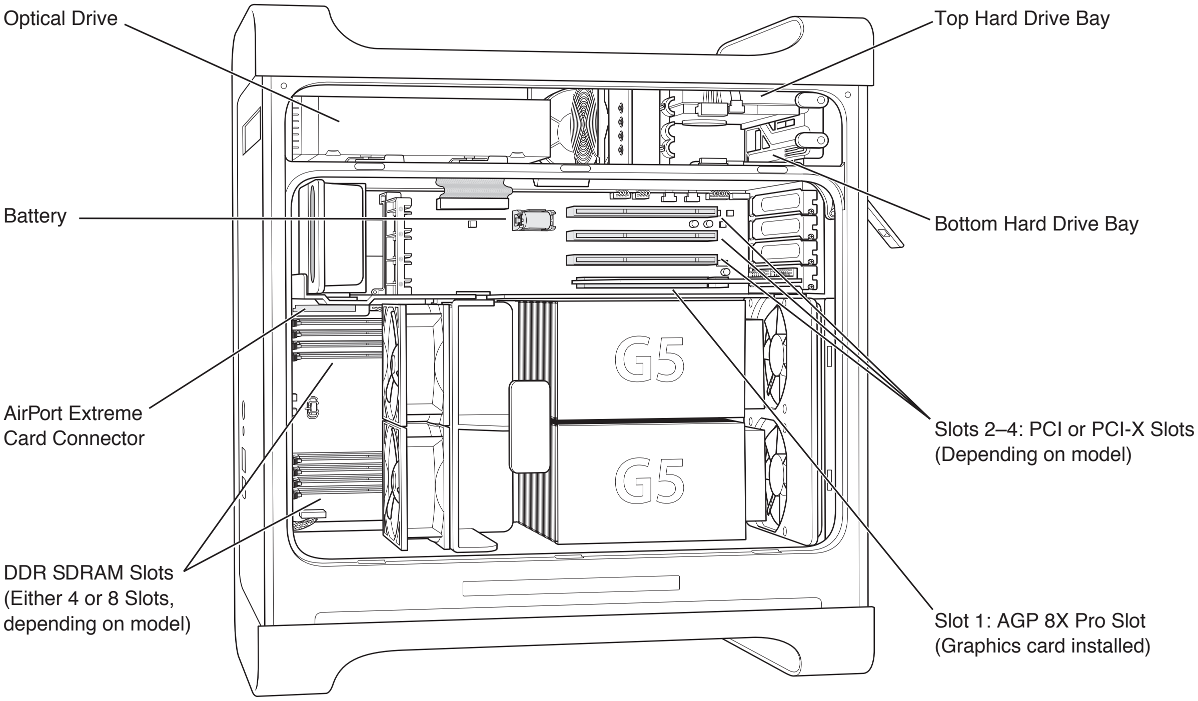

Guide, PCI Card
922-5958
Cable, Extension, MPU
922-6567
Heat Cover, G5
922-6389
Divider, PCI
922-6533
Processor, LCS
Dual 2.7 GHz 661-3588
Shield, EMI, Ports
922-6206
Enclosure
922-6772
Inlet Frame
922-6393, Delphi
922-6394, Panasonic
Ambient
Board
Sensor
922-6559
Soft Modem
922-6492
Logic Board
661-3585
Split Processor
Standoff
922-6325
G5

Screw Matrix

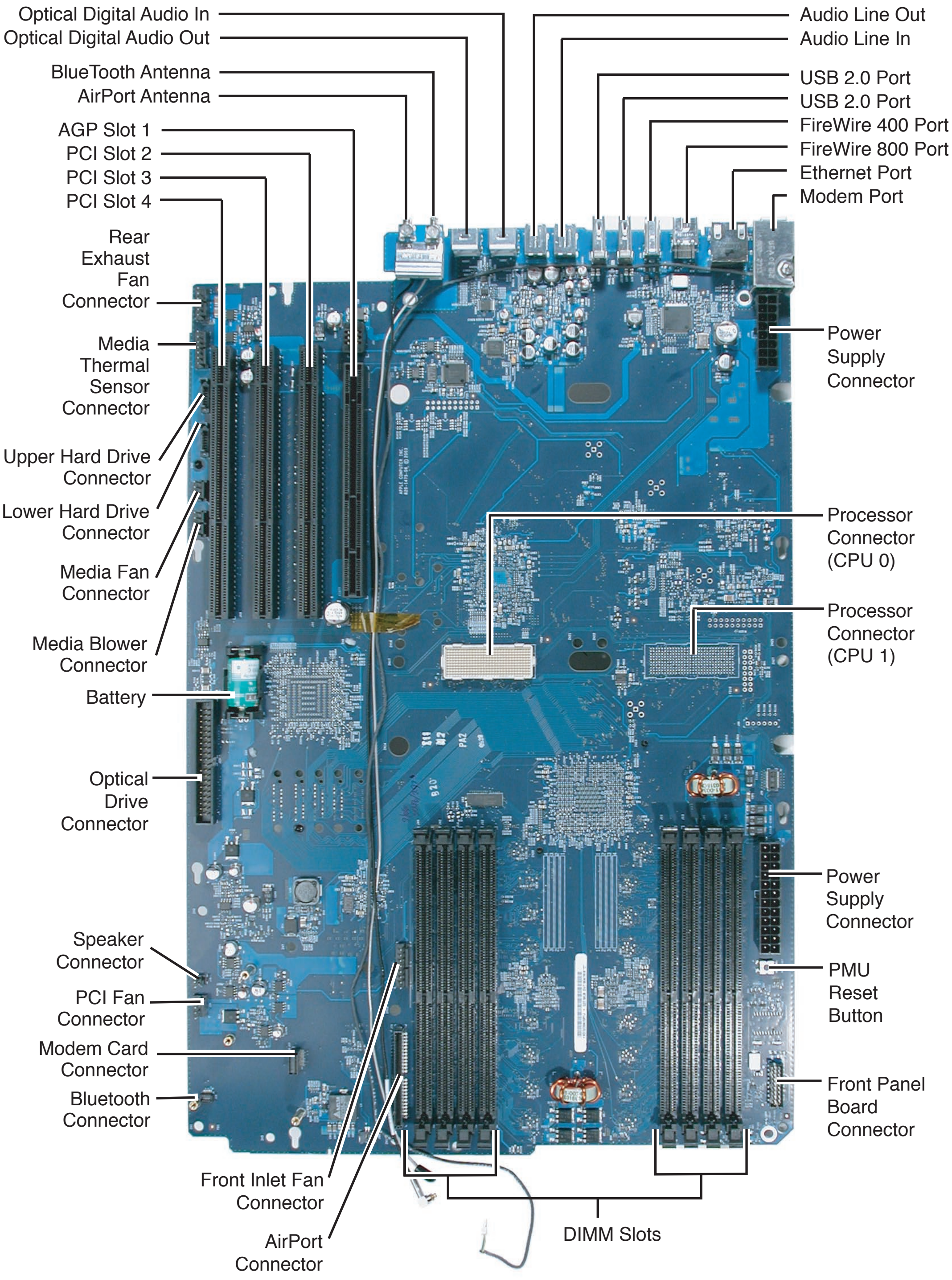
922-4332  Video card port bracket	**922-5846**  Modem, Bluetooth card, front panel board	**922-5972**  Power supply bottom case
922-5974  Logic board, PCI divider	**922-6306**  Optical drive (Sony)	**922-6024**  PCI fence, AGP/PCI cards
922-6325   **922-6027** Processor	**922-6035**  Speaker	**922-6305**  Optical drive (Toshiba or Pioneer)
922-6169  Power supply top cover	**922-6252**  Modem plug, antenna brd.	**922-6253**  Hard drive

Internal Views, Power Mac G5

Overview

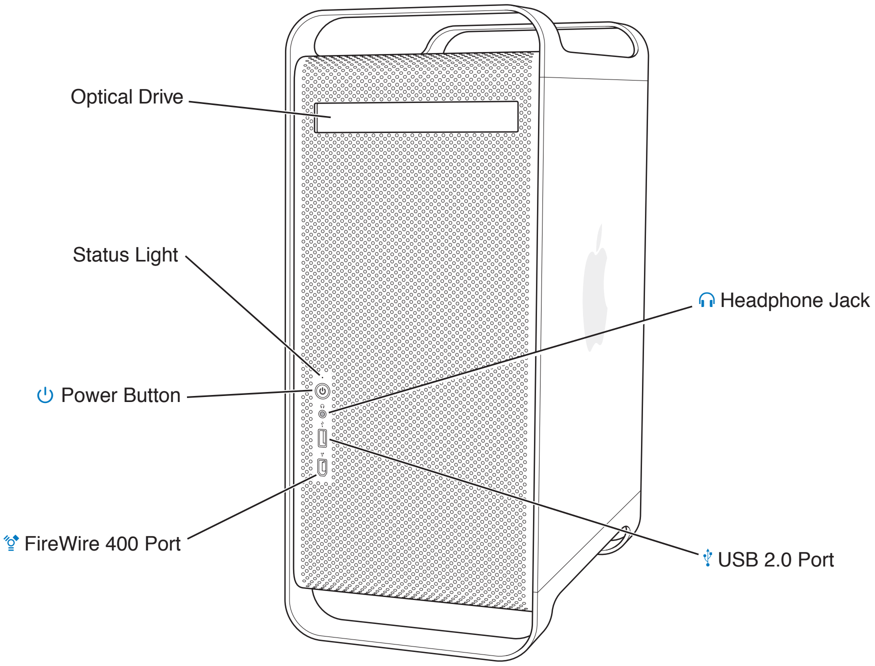

Optical Drive
Top Hard Drive Bay
Battery
Bottom Hard Drive Bay
AirPort Extreme Card Connector
Slots 2–4: PCI or PCI-X Slots (Depending on model)
DDR SDRAM Slots (Either 4 or 8 Slots, depending on model)
Slot 1: AGP 8X Pro Slot (Graphics card installed)
G5
G5

Logic Board, Power Mac G5

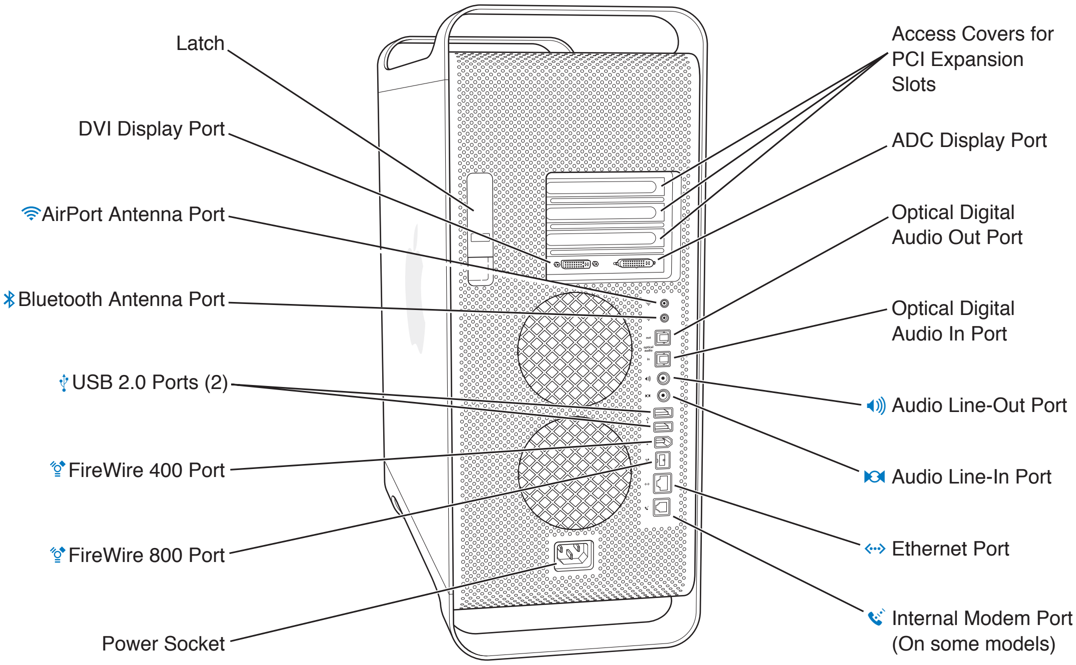

Optical Digital Audio In
Optical Digital Audio Out
BlueTooth Antenna
AirPort Antenna
AGP Slot 1
PCI Slot 2
PCI Slot 3
PCI Slot 4
Rear Exhaust Fan Connector
Media Thermal Sensor Connector
Upper Hard Drive Connector
Lower Hard Drive Connector
Media Fan Connector
Media Blower Connector
Battery
Optical Drive Connector
Speaker Connector
PCI Fan Connector
Modem Card Connector
Bluetooth Connector
Front Inlet Fan Connector
AirPort Connector
DIMM Slots
Audio Line Out
Audio Line In
USB 2.0 Port
USB 2.0 Port
FireWire 400 Port
FireWire 800 Port
Ethernet Port
Modem Port
Power Supply Connector
Processor Connector (CPU 0)
Processor Connector (CPU 1)
Power Supply Connector
PMU Reset Button
Front Panel Board Connector

External Views

Front View


Optical Drive
Status Light
Headphone Jack
Power Button
FireWire 400 Port
USB 2.0 Port

Rear View


Latch
DVI Display Port
AirPort Antenna Port
Bluetooth Antenna Port
USB 2.0 Ports (2)
FireWire 400 Port
FireWire 800 Port
Power Socket
Access Covers for PCI Expansion Slots
ADC Display Port
Optical Digital Audio Out Port
Optical Digital Audio In Port
Audio Line-Out Port
Audio Line-In Port
Ethernet Port
Internal Modem Port (On some models)